Also preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a sequence of at least 50 contiguous nucleotides in the nucleotide sequence of the cDNA in the related cDNA clone contained in the deposit.

Also preferred is an isolated nucleic acid molecule, wherein said sequence of at least 50 contiguous nucleotides is included in the nucleotide sequence of an open reading frame sequence encoded by the cDNA in the related cDNA clone contained in the deposit.

Also preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to sequence of at least 150 contiguous nucleotides in the nucleotide sequence encoded by the cDNA in the related cDNA clone contained in the deposit.

A further preferred embodiment is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to sequence of at least 500 contiguous nucleotides in the nucleotide sequence encoded by the cDNA in the related cDNA clone contained in the deposit.

A further preferred embodiment is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to the complete nucleotide sequence encoded by the cDNA in the related cDNA clone contained in the deposit.

A further preferred embodiment is a method for detecting in a biological sample a nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X or the complementary strand thereto; and a nucleotide sequence encoded by the cDNA in the related cDNA clone contained in the deposit; which method comprises a step of comparing a nucleotide sequence of at least one nucleic acid molecule in said sample with a sequence selected from said group and determining whether the sequence of said nucleic acid molecule in said sample is at least 95% identical to said selected sequence.

Also preferred is the above method wherein said step of comparing sequences comprises determining the extent of nucleic acid hybridization between nucleic acid molecules in said sample and a nucleic acid molecule comprising said sequence selected from said group. Similarly, also preferred is the above method wherein said step of comparing sequences is performed by comparing the nucleotide sequence determined from a

nucleic acid molecule in said sample with said sequence selected from said group. The nucleic acid molecules can comprise DNA molecules or RNA molecules.

A further preferred embodiment is a method for identifying the species, tissue or cell type of a biological sample which method comprises a step of detecting nucleic acid molecules in said sample, if any, comprising a nucleotide sequence that is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X or the complementary strand thereto; and a nucleotide sequence encoded by the cDNA in the related cDNA clone contained in the deposit.

Also preferred is the above method for identifying the species, tissue or cell type of a biological sample which comprises a step of detecting nucleic acid molecules comprising a nucleotide sequence in a panel of at least two nucleotide sequences, wherein at least one sequence in said panel is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from said group.

Also preferred is a method for diagnosing in a subject a pathological condition associated with abnormal structure or expression of a nucleotide sequence of SEQ ID NO:X; or the cDNA in the related cDNA clone identified in Table 1 which encodes a protein, wherein the method comprises a step of detecting in a biological sample obtained from said subject nucleic acid molecules, if any, comprising a nucleotide sequence that is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X or the complementary strand thereto; and a nucleotide sequence of the cDNA in the related cDNA clone contained in the deposit.

Also preferred is the above method for diagnosing a pathological condition which comprises a step of detecting nucleic acid molecules comprising a nucleotide sequence in a panel of at least two nucleotide sequences, wherein at least one sequence in said panel is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from said group.

Also preferred is a composition of matter comprising isolated nucleic acid molecules wherein the nucleotide sequences of said nucleic acid molecules comprise a panel of at least two nucleotide sequences, wherein at least one sequence in said panel is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the

group consisting of: a nucleotide sequence of SEQ ID NO:X or the complementary strand thereto; and a nucleotide sequence encoded by the cDNA in the related cDNA clone contained in the deposit. The nucleic acid molecules can comprise DNA molecules or RNA molecules.

Also preferred is a composition of matter comprising isolated nucleic acid molecules wherein the nucleotide sequences of said nucleic acid molecules comprise a DNA microarray or "chip" of at least 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 40, 50, 100, 150, 200, 250, 300, 500, 1000, 2000, 3000 or 4000 nucleotide sequences, wherein at least one sequence in said DNA microarray or "chip" is at least 95% identical to a sequence of at least 50 contiguous nucleotides in a sequence selected from the group consisting of: a nucleotide sequence of SEQ ID NO:X or the complementary strand thereto; and a nucleotide sequence encoded by the cDNA in the cDNA clone referenced in Table 1. The nucleic acid molecules can comprise DNA molecules or RNA molecules.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 90% identical to a sequence of at least about 10 contiguous amino acids in the polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and/or a polypeptide encoded by the cDNA in the related cDNA clone contained in the deposit.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 30 contiguous amino acids in the amino acid sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and/or a polypeptide encoded by the cDNA in the related cDNA clone contained in the deposit.

Further preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 100 contiguous amino acids in the amino acid sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and/or a polypeptide encoded by the cDNA in the related cDNA clone contained in the deposit.

Further preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to the complete amino acid sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and/or a polypeptide encoded by the cDNA in the related cDNA clone contained in the deposit.

Further preferred is an isolated polypeptide comprising an amino acid sequence at least 90% identical to a sequence of at least about 10 contiguous amino acids in the complete amino acid sequence of a polypeptide encoded by the cDNA clone referenced in Table 1.

Also preferred is a polypeptide wherein said sequence of contiguous amino acids is included in the amino acid sequence of a portion of said polypeptide encoded by the cDNA clone referenced in Table 1; a polypeptide encoded by SEQ ID NO:X; and/or the polypeptide sequence of SEQ ID NO:Y.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 30 contiguous amino acids in the amino acid sequence of a polypeptide encoded by the cDNA clone referenced in Table 1.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence of at least about 100 contiguous amino acids in the amino acid sequence of a polypeptide encoded by the cDNA clone referenced in Table 1.

Also preferred is an isolated polypeptide comprising an amino acid sequence at least 95% identical to the amino acid sequence of a polypeptide encoded by the cDNA clone referenced in Table 1.

Further preferred is an isolated antibody which binds specifically to a polypeptide comprising an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: a polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone contained in the deposit.

Further preferred is a method for detecting in a biological sample a polypeptide comprising an amino acid sequence which is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: a polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1; which method comprises a step of comparing an amino acid sequence of at least one polypeptide molecule in said sample with a sequence selected from said group and determining whether the sequence of said polypeptide molecule in said sample is at least 90% identical to said sequence of at least 10 contiguous amino acids.

Also preferred is the above method wherein said step of comparing an amino acid sequence of at least one polypeptide molecule in said sample with a sequence selected from said group comprises determining the extent of specific binding of polypeptides in said sample to an antibody which binds specifically to a polypeptide comprising an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in

a sequence selected from the group consisting of: a polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1.

Also preferred is the above method wherein said step of comparing sequences is performed by comparing the amino acid sequence determined from a polypeptide molecule in said sample with said sequence selected from said group.

Also preferred is a method for identifying the species, tissue or cell type of a biological sample which method comprises a step of detecting polypeptide molecules in said sample, if any, comprising an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1.

Also preferred is the above method for identifying the species, tissue or cell type of a biological sample, which method comprises a step of detecting polypeptide molecules comprising an amino acid sequence in a panel of at least two amino acid sequences, wherein at least one sequence in said panel is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the above group.

Also preferred is a method for diagnosing in a subject a pathological condition associated with abnormal structure or expression of a nucleic acid sequence identified in Table 1 encoding a polypeptide, which method comprises a step of detecting in a biological sample obtained from said subject polypeptide molecules comprising an amino acid sequence in a panel of at least two amino acid sequences, wherein at least one sequence in said panel is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of: polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1.

In any of these methods, the step of detecting said polypeptide molecules includes using an antibody.

Also preferred is an isolated nucleic acid molecule comprising a nucleotide sequence which is at least 95% identical to a nucleotide sequence encoding a polypeptide wherein said polypeptide comprises an amino acid sequence that is at least 90% identical to a sequence of at least 10 contiguous amino acids in a sequence selected from the group consisting of:

polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1.

Also preferred is an isolated nucleic acid molecule, wherein said nucleotide sequence encoding a polypeptide has been optimized for expression of said polypeptide in a prokaryotic host.

Also preferred is an isolated nucleic acid molecule, wherein said polypeptide comprises an amino acid sequence selected from the group consisting of: polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1.

Further preferred is a method of making a recombinant vector comprising inserting any of the above isolated nucleic acid molecule into a vector. Also preferred is the recombinant vector produced by this method. Also preferred is a method of making a recombinant host cell comprising introducing the vector into a host cell, as well as the recombinant host cell produced by this method.

Also preferred is a method of making an isolated polypeptide comprising culturing this recombinant host cell under conditions such that said polypeptide is expressed and recovering said polypeptide. Also preferred is this method of making an isolated polypeptide, wherein said recombinant host cell is a eukaryotic cell and said polypeptide is a human protein comprising an amino acid sequence selected from the group consisting of: polypeptide sequence of SEQ ID NO:Y; a polypeptide encoded by SEQ ID NO:X; and a polypeptide encoded by the cDNA in the related cDNA clone referenced in Table 1. The isolated polypeptide produced by this method is also preferred.

Also preferred is a method of treatment of an individual in need of an increased level of a protein activity, which method comprises administering to such an individual a Therapeutic comprising an amount of an isolated polypeptide, polynucleotide, immunogenic fragment or analogue thereof, binding agent, antibody, or antigen binding fragment of the claimed invention effective to increase the level of said protein activity in said individual.

Also preferred is a method of treatment of an individual in need of a decreased level of a protein activity, which method comprised administering to such an individual a Therapeutic comprising an amount of an isolated polypeptide, polynucleotide, immunogenic fragment or analogue thereof, binding agent, antibody, or antigen binding fragment of the claimed invention effective to decrease the level of said protein activity in said individual.

Having generally described the invention, the same will be more readily understood by reference to the following examples, which are provided by way of illustration and are not intended as limiting.

Examples

Example 1: Isolation of a Selected cDNA Clone From the Deposited Sample

Each deposited cDNA clone is contained in a plasmid vector. Table 5 identifies the vectors used to construct the cDNA library from which each clone was isolated. In many cases, the vector used to construct the library is a phage vector from which a plasmid has been excised. The following correlates the related plasmid for each phage vector used in constructing the cDNA library. For example, where a particular clone is identified in Table 5 as being isolated in the vector "Lambda Zap," the corresponding deposited clone is in "pBluescript."

Vector Used to Construct Library	Corresponding Deposited Plasmid
Lambda Zap	pBluescript (pBS)
Uni-Zap XR	pBluescript (pBS)
Zap Express	pBK
lafmid BA	plafmid BA
pSport1	pSport1
pCMVSport 2.0	pCMVSport 2.0
pCMVSport 3.0	pCMVSport 3.0
pCR®2.1	pCR®2.1

Vectors Lambda Zap (U.S. Patent Nos. 5,128,256 and 5,286,636), Uni-Zap XR (U.S. Patent Nos. 5,128, 256 and 5,286,636), Zap Express (U.S. Patent Nos. 5,128,256 and 5,286,636), pBluescript (pBS) (Short, J. M. et al., Nucleic Acids Res. 16:7583-7600 (1988); Alting-Mees, M. A. and Short, J. M., Nucleic Acids Res. 17:9494 (1989)) and pBK (Alting-Mees, M. A. et al., Strategies 5:58-61 (1992)) are commercially available from Stratagene Cloning Systems, Inc., 11011 N. Torrey Pines Road, La Jolla, CA, 92037. pBS contains an ampicillin resistance gene and pBK contains a neomycin resistance gene. Both can be transformed into E. coli strain XL-1 Blue, also available from Stratagene. pBS comes in 4 forms SK+, SK-, KS+ and KS. The S and K refers to the orientation of the polylinker to the T7 and T3

primer sequences which flank the polylinker region ("S" is for SacI and "K" is for KpnI which are the first sites on each respective end of the linker). "+" or "-" refer to the orientation of the f1 origin of replication ("ori"), such that in one orientation, single stranded rescue initiated from the f1 ori generates sense strand DNA and in the other, antisense.

Vectors pSport1, pCMVSport 2.0 and pCMVSport 3.0, were obtained from Life Technologies, Inc., P. O. Box 6009, Gaithersburg, MD 20897. All Sport vectors contain an ampicillin resistance gene and may be transformed into E. coli strain DH10B, also available from Life Technologies. (See, for instance, Gruber, C. E., et al., Focus 15:59 (1993).) Vector lafmid BA (Bento Soares, Columbia University, NY) contains an ampicillin resistance gene and can be transformed into E. coli strain XL-1 Blue. Vector pCR®2.1, which is available from Invitrogen, 1600 Faraday Avenue, Carlsbad, CA 92008, contains an ampicillin resistance gene and may be transformed into E. coli strain DH10B, available from Life Technologies. (See, for instance, Clark, J. M., Nuc. Acids Res. 16:9677-9686 (1988) and Mead, D. et al., Bio/Technology 9: (1991).) Preferably, a polynucleotide of the present invention does not comprise the phage vector sequences identified for the particular clone in Table 5, as well as the corresponding plasmid vector sequences designated above.

The deposited material in the sample assigned the ATCC Deposit Number cited by reference to Table 2 and 5 for any given cDNA clone also may contain one or more additional plasmids, each comprising a cDNA clone different from that given clone. Thus, deposits sharing the same ATCC Deposit Number contain at least a plasmid for each cDNA clone referenced in Table 1.

TABLE 5

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HUKA HUKB HUKC HUKD HUKE HUKF HUKG	Human Uterine Cancer	Lambda ZAP II	LP01
HCNA HCNB	Human Colon	Lambda Zap II	LP01
HFFA	Human Fetal Brain, random primed	Lambda Zap II	LP01
HTWA	Resting T-Cell	Lambda ZAP II	LP01
HBQA	Early Stage Human Brain, random primed	Lambda ZAP II	LP01
HLMB HLMF HLMG HLMH HLMI HLMJ HLMM HLMN	breast lymph node CDNA library	Lambda ZAP II	LP01
HCQA HCQB	human colon cancer	Lamda ZAP II	LP01
HMEA HMEC HMED HMEE HMEF HMEG HMEI HMEJ HMEK HMEL	Human Microvascular Endothelial Cells, fract. A	Lambda ZAP II	LP01
HUSA HUSC	Human Umbilical Vein Endothelial Cells, fract. A	Lambda ZAP II	LP01
HLQA HLQB	Hepatocellular Tumor	Lambda ZAP II	LP01
HHGA HHGB HHGC HHGD	Hemangiopericytoma	Lambda ZAP II	LP01
HSDM	Human Striatum Depression, re-rescue	Lambda ZAP II	LP01
HUSH	H Umbilical Vein Endothelial Cells, frac A, re-excision	Lambda ZAP II	LP01
HSGS	Salivary gland, subtracted	Lambda ZAP II	LP01
HFXA HFXB HFXC HFXD HFXE HFXF HFXG HFXH	Brain frontal cortex	Lambda ZAP II	LP01
HPQA HPQB HPQC	PERM TF274	Lambda ZAP II	LP01
HFXJ HFXK	Brain Frontal Cortex, re-excision	Lambda ZAP II	LP01
HCWA HCWB HCWC HCWD HCWE HCWF HCWG HCWH HCWI HCWJ HCWK	CD34 positive cells (Cord Blood)	ZAP Express	LP02
HCUA HCUB HCUC	CD34 depleted Buffy Coat (Cord Blood)	ZAP Express	LP02
HRSM	A-14 cell line	ZAP Express	LP02
HRSA	A1-CELL LINE	ZAP Express	LP02
HCUD HCUE HCUF HCUG HCUH HCUI	CD34 depleted Buffy Coat (Cord Blood), re-excision	ZAP Express	LP02
HBXE HBXF HBXG	H. Whole Brain #2, re-excision	ZAP Express	LP02
HRLM	L8 cell line	ZAP Express	LP02
HBXA HBXB HBXC HBXD	Human Whole Brain #2 - Oligo dT > 1.5Kb	ZAP Express	LP02
HUDA HUDB HUDC	Testes	ZAP Express	LP02
HHTM HHTN HHTO	H. hypothalamus, frac A;re-excision	ZAP Express	LP02
HHTL	H. hypothalamus, frac A	ZAP Express	LP02
HASA HASD	Human Adult Spleen	Uni-ZAP XR	LP03
HFKC HFKD HFKE HFKF HFKG	Human Fetal Kidney	Uni-ZAP XR	LP03
HE8A HE8B HE8C HE8D HE8E HE8F HE8M HE8N	Human 8 Week Whole Embryo	Uni-ZAP XR	LP03
HGBA HGBD HGBE HGBF HGBG HGBH HGBI	Human Gall Bladder	Uni-ZAP XR	LP03
HLHA HLHB HLHC HLHD HLHE HLHF HLHG HLHH HLHQ	Human Fetal Lung III	Uni-ZAP XR	LP03
HPMA HPMB HPMC HPMD HPME HPMF HPMG HPMH	Human Placenta	Uni-ZAP XR	LP03

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HPRA HPRB HPRC HPRD	Human Prostate	Uni-ZAP XR	LP03
HSIA HSIC HSID HSIE	Human Adult Small Intestine	Uni-ZAP XR	LP03
HTEA HTEB HTEC HTED HTEE HTEF HTEG HTEH HTEI HTEJ HTEK	Human Testes	Uni-ZAP XR	LP03
HTPA HTPB HTPC HTPD HTPE	Human Pancreas Tumor	Uni-ZAP XR	LP03
HTTA HTTB HTTC HTTD HTTE HTTF	Human Testes Tumor	Uni-ZAP XR	LP03
HAPA HAPB HAPC HAPM	Human Adult Pulmonary	Uni-ZAP XR	LP03
HETA HETB HETC HETD HETE HETF HETG HETH HETI	Human Endometrial Tumor	Uni-ZAP XR	LP03
HHFB HHFC HHFD HHFE HHFF HHFG HHFH HHFI	Human Fetal Heart	Uni-ZAP XR	LP03
HHPB HHPC HHPD HHPE HHPF HHPG HHPH	Human Hippocampus	Uni-ZAP XR	LP03
HCE1 HCE2 HCE3 HCE4 HCE5 HCEB HCEC HCED HCEE HCEF HCEG	Human Cerebellum	Uni-ZAP XR	LP03
HUVB HUVC HUVD HUVE	Human Umbilical Vein, Endo. remake	Uni-ZAP XR	LP03
HSTA HSTB HSTC HSTD	Human Skin Tumor	Uni-ZAP XR	LP03
HTAA HTAB HTAC HTAD HTAE	Human Activated T-Cells	Uni-ZAP XR	LP03
HFEA HFEB HFEC	Human Fetal Epithelium (Skin)	Uni-ZAP XR	LP03
HJPA HJPB HJPC HJPD	HUMAN JURKAT MEMBRANE BOUND POLYSOMES	Uni-ZAP XR	LP03
HESA	Human epithelioid sarcoma	Uni-Zap XR	LP03
HLTA HLTB HLTC HLTD HLTE HLTF	Human T-Cell Lymphoma	Uni-ZAP XR	LP03
HFTA HFTB HFTC HFTD	Human Fetal Dura Mater	Uni-ZAP XR	LP03
HRDA HRDB HRDC HRDD HRDE HRDF	Human Rhabdomyosarcoma	Uni-ZAP XR	LP03
HCAA HCAB HCAC	Cem cells cyclohexamide treated	Uni-ZAP XR	LP03
HRGA HRGB HRGC HRGD	Raji Cells, cyclohexamide treated	Uni-ZAP XR	LP03
HSUA HSUB HSUC HSUM	Supt Cells, cyclohexamide treated	Uni-ZAP XR	LP03
HT4A HT4C HT4D	Activated T-Cells, 12 hrs.	Uni-ZAP XR	LP03
HE9A HE9B HE9C HE9D HE9E HE9F HE9G HE9H HE9M HE9N	Nine Week Old Early Stage Human	Uni-ZAP XR	LP03
HATA HATB HATC HATD HATE	Human Adrenal Gland Tumor	Uni-ZAP XR	LP03
HT5A	Activated T-Cells, 24 hrs.	Uni-ZAP XR	LP03
HFGA HFGM	Human Fetal Brain	Uni-ZAP XR	LP03
HNEA HNEB HNEC HNED HNEE	Human Neutrophil	Uni-ZAP XR	LP03
HBGB HBGD	Human Primary Breast Cancer	Uni-ZAP XR	LP03
HBNA HBNB	Human Normal Breast	Uni-ZAP XR	LP03
HCAS	Cem Cells, cyclohexamide treated, subtra	Uni-ZAP XR	LP03
HHPS	Human Hippocampus, subtracted	pBS	LP03
HKCS HKCU	Human Colon Cancer, subtracted	pBS	LP03
HRGS	Raji cells, cyclohexamide treated, subtracted	pBS	LP03
HSUT	Supt cells, cyclohexamide treated, differentially expressed	pBS	LP03
HT4S	Activated T-Cells, 12 hrs, subtracted	Uni-ZAP XR	LP03
HCDA HCDB HCDC HCDD HCDE	Human Chondrosarcoma	Uni-ZAP XR	LP03
HOAA HOAB HOAC	Human Osteosarcoma	Uni-ZAP XR	LP03
HTLA HTLB HTLC HTLD HTLE	Human adult testis, large inserts	Uni-ZAP XR	LP03

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HTLF			
HLMA HLMC HLMD	Breast Lymph node cDNA library	Uni-ZAP XR	LP03
H6EA H6EB H6EC	HL-60, PMA 4H	Uni-ZAP XR	LP03
HTXA HTXB HTXC HTXD HTXE HTXF HTXG HTXH	Activated T-Cell (12hs)/Thiouridine labelledEco	Uni-ZAP XR	LP03
HNFA HNFB HNFC HNFD HNFE HNFF HNFG HNFH HNFJ	Human Neutrophil, Activated	Uni-ZAP XR	LP03
HTOB HTOC	HUMAN TONSILS, FRACTION 2	Uni-ZAP XR	LP03
HMGB	Human OB MG63 control fraction I	Uni-ZAP XR	LP03
HOPB	Human OB HOS control fraction I	Uni-ZAP XR	LP03
HORB	Human OB HOS treated (10 nM E2) fraction I	Uni-ZAP XR	LP03
HSVA HSVB HSVC	Human Chronic Synovitis	Uni-ZAP XR	LP03
HROA	HUMAN STOMACH	Uni-ZAP XR	LP03
HBJA HBJB HBJC HBJD HBJE HBJF HBJG HBJH HBJI HBJJ HBJK	HUMAN B CELL LYMPHOMA	Uni-ZAP XR	LP03
HCRA HCRB HCRC	human corpus colosum	Uni-ZAP XR	LP03
HODA HODB HODC HODD	human ovarian cancer	Uni-ZAP XR	LP03
HDSA	Dermatofibrosarcoma Protuberance	Uni-ZAP XR	LP03
HMWA HMWB HMWC HMWD HMWE HMWF HMWG HMWH HMWI HMWJ	Bone Marrow Cell Line (RS4;11)	Uni-ZAP XR	LP03
HSOA	stomach cancer (human)	Uni-ZAP XR	LP03
HERA	SKIN	Uni-ZAP XR	LP03
HMDA	Brain-medulloblastoma	Uni-ZAP XR	LP03
HGLA HGLB HGLD	Glioblastoma	Uni-ZAP XR	LP03
HEAA	H. Atrophic Endometrium	Uni-ZAP XR	LP03
HBCA HBCB	H. Lymph node breast Cancer	Uni-ZAP XR	LP03
HPWT	Human Prostate BPH, re-excision	Uni-ZAP XR	LP03
HFVG HFVH HFVI	Fetal Liver, subtraction II	pBS	LP03
HNFI	Human Neutrophils, Activated, re-excision	pBS	LP03
HBMB HBMC HBMD	Human Bone Marrow, re-excision	pBS	LP03
HKML HKMM HKMN	H. Kidney Medulla, re-excision	pBS	LP03
HKIX HKIY	H. Kidney Cortex, subtracted	pBS	LP03
HADT	H. Amygdala Depression, subtracted	pBS	LP03
H6AS	Hl-60, untreated, subtracted	Uni-ZAP XR	LP03
H6ES	HL-60, PMA 4H, subtracted	Uni-ZAP XR	LP03
H6BS	HL-60, RA 4h, Subtracted	Uni-ZAP XR	LP03
H6CS	HL-60, PMA 1d, subtracted	Uni-ZAP XR	LP03
HTXJ HTXK	Activated T-cell(12h)/Thiouridine-re-excision	Uni-ZAP XR	LP03
HMSA HMSB HMSC HMSD HMSE HMSF HMSG HMSH HMSI HMSJ HMSK	Monocyte activated	Uni-ZAP XR	LP03
HAGA HAGB HAGC HAGD HAGE HAGF	Human Amygdala	Uni-ZAP XR	LP03
HSRA HSRB HSRE	STROMAL -OSTEOCLASTOMA	Uni-ZAP XR	LP03
HSRD HSRF HSRG HSRH	Human Osteoclastoma Stromal Cells - unamplified	Uni-ZAP XR	LP03
HSQA HSQB HSQC HSQD HSQE	Stromal cell TF274	Uni-ZAP XR	LP03

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HSQF HSQG			
HSKA HSKB HSKC HSKD HSKE HSKF HSKZ	Smooth muscle, serum treated	Uni-ZAP XR	LP03
HSLA HSLB HSLC HSLD HSLE HSLF HSLG	Smooth muscle,control	Uni-ZAP XR	LP03
HSDA HSDD HSDE HSDF HSDG HSDH	Spinal cord	Uni-ZAP XR	LP03
HPWS	Prostate-BPH subtracted II	pBS	LP03
HSKW HSKX HSKY	Smooth Muscle- HASTE normalized	pBS	LP03
HFPB HFPC HFPD	H. Frontal cortex,epileptic;re-excision	Uni-ZAP XR	LP03
HSDI HSDJ HSDK	Spinal Cord, re-excision	Uni-ZAP XR	LP03
HSKN HSKO	Smooth Muscle Serum Treated, Norm	pBS	LP03
HSKG HSKH HSKI	Smooth muscle, serum induced,re-exc	pBS	LP03
HFCA HFCB HFCC HFCD HFCE HFCF	Human Fetal Brain	Uni-ZAP XR	LP04
HPTA HPTB HPTD	Human Pituitary	Uni-ZAP XR	LP04
HTHB HTHC HTHD	Human Thymus	Uni-ZAP XR	LP04
HE6B HE6C HE6D HE6E HE6F HE6G HE6S	Human Whole Six Week Old Embryo	Uni-ZAP XR	LP04
HSSA HSSB HSSC HSSD HSSE HSSF HSSG HSSH HSSI HSSJ HSSK	Human Synovial Sarcoma	Uni-ZAP XR	LP04
HE7T	7 Week Old Early Stage Human, subtracted	Uni-ZAP XR	LP04
HEPA HEPB HEPC	Human Epididymus	Uni-ZAP XR	LP04
HSNA HSNB HSNC HSNM HSNN	Human Synovium	Uni-ZAP XR	LP04
HPFB HPFC HPFD HPFE	Human Prostate Cancer, Stage C fraction	Uni-ZAP XR	LP04
HE2A HE2D HE2E HE2H HE2I HE2M HE2N HE2O	12 Week Old Early Stage Human	Uni-ZAP XR	LP04
HE2B HE2C HE2F HE2G HE2P HE2Q	12 Week Old Early Stage Human, II	Uni-ZAP XR	LP04
HPTS HPTT HPTU	Human Pituitary, subtracted	Uni-ZAP XR	LP04
HAUA HAUB HAUC	Amniotic Cells - TNF induced	Uni-ZAP XR	LP04
HAQA HAQB HAQC HAQD	Amniotic Cells - Primary Culture	Uni-ZAP XR	LP04
HWTA HWTB HWTC	wilm's tumor	Uni-ZAP XR	LP04
HBSD	Bone Cancer, re-excision	Uni-ZAP XR	LP04
HSGB	Salivary gland, re-excision	Uni-ZAP XR	LP04
HSJA HSJB HSJC	Smooth muscle-ILb induced	Uni-ZAP XR	LP04
HSXA HSXB HSXC HSXD	Human Substantia Nigra	Uni-ZAP XR	LP04
HSHA HSHB HSHC	Smooth muscle, IL1b induced	Uni-ZAP XR	LP04
HOUA HOUB HOUC HOUD HOUE	Adipocytes	Uni-ZAP XR	LP04
HPWA HPWB HPWC HPWD HPWE	Prostate BPH	Uni-ZAP XR	LP04
HELA HELB HELC HELD HELE HELF HELG HELH	Endothelial cells-control	Uni-ZAP XR	LP04
HEMA HEMB HEMC HEMD HEME HEMF HEMG HEMH	Endothelial-induced	Uni-ZAP XR	LP04
HBIA HBIB HBIC	Human Brain, Striatum	Uni-ZAP XR	LP04
HHSA HHSB HHSC HHSD HHSE	Human Hypothalmus,Schizophrenia	Uni-ZAP XR	LP04
HNGA HNGB HNGC HNGD HNGE HNGF HNGG HNGH HNGI HNGJ	neutrophils control	Uni-ZAP XR	LP04
HNHA HNHB HNHC HNHD HNHE HNHF HNHG HNHH HNHI HNHJ	Neutrophils IL-1 and LPS induced	Uni-ZAP XR	LP04
HSDB HSDC	STRIATUM DEPRESSION	Uni-ZAP XR	LP04

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HHPT	Hypothalamus	Uni-ZAP XR	LP04
HSAT HSAU HSAV HSAW HSAX HSAY HSAZ	Anergic T-cell	Uni-ZAP XR	LP04
HBMS HBMT HBMU HBMV HBMW HBMX	Bone marrow	Uni-ZAP XR	LP04
HOEA HOEB HOEC HOED HOEE HOEF HOEJ	Osteoblasts	Uni-ZAP XR	LP04
HAIA HAIB HAIC HAID HAIE HAIF	Epithelial-TNFa and INF induced	Uni-ZAP XR	LP04
HTGA HTGB HTGC HTGD	Apoptotic T-cell	Uni-ZAP XR	LP04
HMCA HMCB HMCC HMCD HMCE	Macrophage-oxLDL	Uni-ZAP XR	LP04
HMAA HMAB HMAC HMAD HMAE HMAF HMAG	Macrophage (GM-CSF treated)	Uni-ZAP XR	LP04
HPHA	Normal Prostate	Uni-ZAP XR	LP04
HPIA HPIB HPIC	LNCAP prostate cell line	Uni-ZAP XR	LP04
HPJA HPJB HPJC	PC3 Prostate cell line	Uni-ZAP XR	LP04
HOSE HOSF HOSG	Human Osteoclastoma, re-excision	Uni-ZAP XR	LP04
HTGE HTGF	Apoptotic T-cell, re-excision	Uni-ZAP XR	LP04
HMAJ HMAK	H Macrophage (GM-CSF treated), re-excision	Uni-ZAP XR	LP04
HACB HACC HACD	Human Adipose Tissue, re-excision	Uni-ZAP XR	LP04
HFPA	H. Frontal Cortex, Epileptic	Uni-ZAP XR	LP04
HFAA HFAB HFAC HFAD HFAE	Alzheimers, spongy change	Uni-ZAP XR	LP04
HFAM	Frontal Lobe, Dementia	Uni-ZAP XR	LP04
HMIA HMIB HMIC	Human Manic Depression Tissue	Uni-ZAP XR	LP04
HTSA HTSE HTSF HTSG HTSH	Human Thymus	pBS	LP05
HPBA HPBB HPBC HPBD HPBE	Human Pineal Gland	pBS	LP05
HSAA HSAB HSAC	HSA 172 Cells	pBS	LP05
HSBA HSBB HSBC HSBM	HSC172 cells	pBS	LP05
HJAA HJAB HJAC HJAD	Jurkat T-cell G1 phase	pBS	LP05
HJBA HJBB HJBC HJBD	Jurkat T-Cell, S phase	pBS	LP05
HAFA HAFB	Aorta endothelial cells + TNF-a	pBS	LP05
HAWA HAWB HAWC	Human White Adipose	pBS	LP05
HTNA HTNB	Human Thyroid	pBS	LP05
HONA	Normal Ovary, Premenopausal	pBS	LP05
HARA HARB	Human Adult Retina	pBS	LP05
HLJA HLJB	Human Lung	pCMVSport 1	LP06
HOFM HOFN HOFO	H. Ovarian Tumor, II, OV5232	pCMVSport 2.0	LP07
HOGA HOGB HOGC	OV 10-3-95	pCMVSport 2.0	LP07
HCGL	CD34+cells, II	pCMVSport 2.0	LP07
HDLA	Hodgkin's Lymphoma I	pCMVSport 2.0	LP07
HDTA HDTB HDTC HDTD HDTE	Hodgkin's Lymphoma II	pCMVSport 2.0	LP07
HKAA HKAB HKAC HKAD HKAE HKAF HKAG HKAH	Keratinocyte	pCMVSport2.0	LP07
HCIM	CAPFINDER, Crohn's Disease, lib 2	pCMVSport 2.0	LP07
HKAL	Keratinocyte, lib 2	pCMVSport2.0	LP07
HKAT	Keratinocyte, lib 3	pCMVSport2.0	LP07
HNDA	Nasal polyps	pCMVSport2.0	LP07
HDRA	H. Primary Dendritic Cells,lib 3	pCMVSport2.0	LP07

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HOHA HOHB HOHC	Human Osteoblasts II	pCMVSport2.0	LP07
HLDA HLDB HLDC	Liver, Hepatoma	pCMVSport3.0	LP08
HLDN HLDO HLDP	Human Liver, normal	pCMVSport3.0	LP08
HMTA	pBMC stimulated w/ poly I/C	pCMVSport3.0	LP08
HNTA	NTERA2, control	pCMVSport3.0	LP08
HDPA HDPB HDPC HDPD HDPF HDPG HDPH HDPI HDPJ HDPK	Primary Dendritic Cells, lib 1	pCMVSport3.0	LP08
HDPM HDPN HDPO HDPP	Primary Dendritic cells,frac 2	pCMVSport3.0	LP08
HMUA HMUB HMUC	Myoloid Progenitor Cell Line	pCMVSport3.0	LP08
HHEA HHEB HHEC HHED	T Cell helper I	pCMVSport3.0	LP08
HHEM HHEN HHEO HHEP	T cell helper II	pCMVSport3.0	LP08
HEQA HEQB HEQC	Human endometrial stromal cells	pCMVSport3.0	LP08
HJMA HJMB	Human endometrial stromal cells-treated with progesterone	pCMVSport3.0	LP08
HSWA HSWB HSWC	Human endometrial stromal cells-treated with estradiol	pCMVSport3.0	LP08
HSYA HSYB HSYC	Human Thymus Stromal Cells	pCMVSport3.0	LP08
HLWA HLWB HLWC	Human Placenta	pCMVSport3.0	LP08
HRAA HRAB HRAC	Rejected Kidney, lib 4	pCMVSport3.0	LP08
HMTM	PCR, pBMC I/C treated	PCRII	LP09
HMJA	H. Meniingima, M6	pSport 1	LP10
HMKA HMKB HMKC HMKD HMKE	H. Meningima, M1	pSport 1	LP10
HUSG HUSI	Human umbilical vein endothelial cells, IL-4 induced	pSport 1	LP10
HUSX HUSY	Human Umbilical Vein Endothelial Cells, uninduced	pSport 1	LP10
HOFA	Ovarian Tumor I, OV5232	pSport 1	LP10
HCFA HCFB HCFC HCFD	T-Cell PHA 16 hrs	pSport 1	LP10
HCFL HCFM HCFN HCFO	T-Cell PHA 24 hrs	pSport 1	LP10
HADA HADC HADD HADE HADF HADG	Human Adipose	pSport 1	LP10
HOVA HOVB HOVC	Human Ovary	pSport 1	LP10
HTWB HTWC HTWD HTWE HTWF	Resting T-Cell Library,II	pSport 1	LP10
HMMA	Spleen metastic melanoma	pSport 1	LP10
HLYA HLYB HLYC HLYD HLYE	Spleen, Chronic lymphocytic leukemia	pSport 1	LP10
HCGA	CD34+ cell, I	pSport 1	LP10
HEOM HEON	Human Eosinophils	pSport 1	LP10
HTDA	Human Tonsil, Lib 3	pSport 1	LP10
HSPA	Salivary Gland, Lib 2	pSport 1	LP10
HCHA HCHB HCHC	Breast Cancer cell line, MDA 36	pSport 1	LP10
HCHM HCHN	Breast Cancer Cell line, angiogenic	pSport 1	LP10
HCIA	Crohn's Disease	pSport 1	LP10
HDAA HDAB HDAC	HEL cell line	pSport 1	LP10
HABA	Human Astrocyte	pSport 1	LP10
HUFA HUFB HUFC	Ulcerative Colitis	pSport 1	LP10
HNTM	NTERA2 + retinoic acid, 14 days	pSport 1	LP10
HDQA	Primary Dendritic cells,CapFinder2, frac 1	pSport 1	LP10
HDQM	Primary Dendritic Cells, CapFinder, frac	pSport 1	LP10

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
	2		
HLDX	Human Liver, normal.CapFinder	pSport 1	LP10
HULA HULB HULC	Human Dermal Endothelial Cells.untreated	pSport1	LP10
HUMA	Human Dermal Endothelial cells.treated	pSport1	LP10
HCJA	Human Stromal Endometrial fibroblasts, untreated	pSport1	LP10
HCJM	Human Stromal endometrial fibroblasts, treated w/ estradiol	pSport1	LP10
HEDA	Human Stromal endometrial fibroblasts, treated with progesterone	pSport1	LP10
HFNA	Human ovary tumor cell OV350721	pSport1	LP10
HKGA HKGB HKGC HKGD	Merkel Cells	pSport1	LP10
HISA HISB HISC	Pancreas Islet Cell Tumor	pSport1	LP10
HLSA	Skin, burned	pSport1	LP10
HBZA	Prostate.BPH, Lib 2	pSport 1	LP10
HBZS	Prostate BPH,Lib 2, subtracted	pSport 1	LP10
HFIA HFIB HFIC	Synovial Fibroblasts (control)	pSport 1	LP10
HFIH HFII HFIJ	Synovial hypoxia	pSport 1	LP10
HFIT HFIU HFIV	Synovial IL-1/TNF stimulated	pSport 1	LP10
HGCA	Messangial cell, frac 1	pSport1	LP10
HMVA HMVB HMVC	Bone Marrow Stromal Cell, untreated	pSport1	LP10
HFIX HFIY HFIZ	Synovial Fibroblasts (Il1/TNF), subt	pSport1	LP10
HFOX HFOY HFOZ	Synovial hypoxia-RSF subtracted	pSport1	LP10
HMQA HMQB HMQC HMQD	Human Activated Monocytes	Uni-ZAP XR	LP11
HLIA HLIB HLIC	Human Liver	pCMVSport 1	LP012
HHBA HHBB HHBC HHBD HHBE	Human Heart	pCMVSport 1	LP012
HBBA HBBB	Human Brain	pCMVSport 1	LP012
HLJA HLJB HLJC HLJD HLJE	Human Lung	pCMVSport 1	LP012
HOGA HOGB HOGC	Ovarian Tumor	pCMVSport 2.0	LP012
HTJM	Human Tonsils, Lib 2	pCMVSport 2.0	LP012
HAMF HAMG	KMH2	pCMVSport 3.0	LP012
HAJA HAJB HAJC	L428	pCMVSport 3.0	LP012
HWBA HWBB HWBC HWBD HWBE	Dendritic cells, pooled	pCMVSport 3.0	LP012
HWAA HWAB HWAC HWAD HWAE	Human Bone Marrow, treated	pCMVSport 3.0	LP012
HYAA HYAB HYAC	B Cell lymphoma	pCMVSport 3.0	LP012
HWHG HWHH HWHI	Healing groin wound, 6.5 hours post incision	pCMVSport 3.0	LP012
HWHP HWHQ HWHR	Healing groin wound; 7.5 hours post incision	pCMVSport 3.0	LP012
HARM	Healing groin wound - zero hr post-incision (control)	pCMVSport 3.0	LP012
HBIM	Olfactory epithelium; nasalcavity	pCMVSport 3.0	LP012
HWDA	Healing Abdomen wound; 70&90 min post incision	pCMVSport 3.0	LP012
HWEA	Healing Abdomen Wound;15 days post incision	pCMVSport 3.0	LP012
HWJA	Healing Abdomen Wound:21&29 days	pCMVSport 3.0	LP012
HNAL	Human Tongue, frac 2	pSport1	LP012
HMJA	H. Meniingima, M6	pSport1	LP012
HMKA HMKB HMKC HMKD HMKE	H. Meningima, M1	pSport1	LP012

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HOFA	Ovarian Tumor I, OV5232	pSport1	LP012
HCFA HCFB HCFC HCFD	T-Cell PHA 16 hrs	pSport1	LP012
HCFL HCFM HCFN HCFO	T-Cell PHA 24 hrs	pSport1	LP012
HMMA HMMB HMMC	Spleen metastic melanoma	pSport1	LP012
HTDA	Human Tonsil, Lib 3	pSport1	LP012
HDBA	Human Fetal Thymus	pSport1	LP012
HDUA	Pericardium	pSport1	LP012
HBZA	Prostate,BPH, Lib 2	pSport1	LP012
HWCA	Larynx tumor	pSport1	LP012
HWKA	Normal lung	pSport1	LP012
HSMB	Bone marrow stroma,treated	pSport1	LP012
HBHM	Normal trachea	pSport1	LP012
HLFC	Human Larynx	pSport1	LP012
HLRB	Siebben Polyposis	pSport1	LP012
HNIA	Mammary Gland	pSport1	LP012
HNJB	Palate carcinoma	pSport1	LP012
HNKA	Palate normal	pSport1	LP012
HMZA	Pharynx carcinoma	pSport1	LP012
HABG	Cheek Carcinoma	pSport1	LP012
HMZM	Pharynx Carcinoma	pSport1	LP012
HDRM	Larynx Carcinoma	pSport1	LP012
HVAA	Pancreas normal PCA4 No	pSport1	LP012
HICA	Tongue carcinoma	pSport1	LP012
HUKA HUKB HUKC HUKD HUKE	Human Uterine Cancer	Lambda ZAP II	LP013
HFFA	Human Fetal Brain, random primed	Lambda ZAP II	LP013
HTUA	Activated T-cell labeled with 4-thioluri	Lambda ZAP II	LP013
HBQA	Early Stage Human Brain, random primed	Lambda ZAP II	LP013
HMEB	Human microvascular Endothelial cells, fract. B	Lambda ZAP II	LP013
HUSH	Human Umbilical Vein Endothelial cells, fract. A, re-excision	Lambda ZAP II	LP013
HLQC HLQD	Hepatocellular tumor, re-excision	Lambda ZAP II	LP013
HTWJ HTWK HTWL	Resting T-cell, re-excision	Lambda ZAP II	LP013
HF6S	Human Whole 6 week Old Embryo (II), subt	pBluescript	LP013
HHPS	Human Hippocampus, subtracted	pBluescript	LP013
HL1S	LNCAP, differential expression	pBluescript	LP013
HLHS HLHT	Early Stage Human Lung, Subtracted	pBluescript	LP013
HSUS	Supt cells, cyclohexamide treated, subtracted	pBluescript	LP013
HSUT	Supt cells, cyclohexamide treated, differentially expressed	pBluescript	LP013
HSDS	H. Striatum Depression, subtracted	pBluescript	LP013
HPTZ	Human Pituitary, Subtracted VII	pBluescript	LP013
HSDX	H. Striatum Depression, subt II	pBluescript	LP013
HSDZ	H. Striatum Depression, subt	pBluescript	LP013
HPBA HPBB HPBC HPBD HPBE	Human Pineal Gland	pBluescript SK-	LP013
HRTA	Colorectal Tumor	pBluescript SK-	LP013
HSBA HSBB HSBC HSBM	HSC172 cells	pBluescript SK-	LP013
HJAA HJAB HJAC HJAD	Jurkat T-cell G1 phase	pBluescript SK-	LP013
HJBA HJBB HJBC HJBD	Jurkat T-cell, S1 phase	pBluescript SK-	LP013

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HTNA HTNB	Human Thyroid	pBluescript SK-	LP013
HAHA HAHB	Human Adult Heart	Uni-ZAP XR	LP013
HE6A	Whole 6 week Old Embryo	Uni-ZAP XR	LP013
HFCA HFCB HFCC HFCD HFCE	Human Fetal Brain	Uni-ZAP XR	LP013
HFKC HFKD HFKE HFKF HFKG	Human Fetal Kidney	Uni-ZAP XR	LP013
HGBA HGBD HGBE HGBF HGBG	Human Gall Bladder	Uni-ZAP XR	LP013
HPRA HPRB HPRC HPRD	Human Prostate	Uni-ZAP XR	LP013
HTEA HTEB HTEC HTED HTEE	Human Testes	Uni-ZAP XR	LP013
HTTA HTTB HTTC HTTD HTTE	Human Testes Tumor	Uni-ZAP XR	LP013
HYBA HYBB	Human Fetal Bone	Uni-ZAP XR	LP013
HFLA	Human Fetal Liver	Uni-ZAP XR	LP013
HHFB HHFC HHFD HHFE HHFF	Human Fetal Heart	Uni-ZAP XR	LP013
HUVB HUVC HUVD HUVE	Human Umbilical Vein, End. remake	Uni-ZAP XR	LP013
HTHB HTHC HTHD	Human Thymus	Uni-ZAP XR	LP013
HSTA HSTB HSTC HSTD	Human Skin Tumor	Uni-ZAP XR	LP013
HTAA HTAB HTAC HTAD HTAE	Human Activated T-cells	Uni-ZAP XR	LP013
HFEA HFEB HFEC	Human Fetal Epithelium (skin)	Uni-ZAP XR	LP013
HJPA HJPB HJPC HJPD	Human Jurkat Membrane Bound Polysomes	Uni-ZAP XR	LP013
HESA	Human Epithelioid Sarcoma	Uni-ZAP XR	LP013
HALS	Human Adult Liver, Subtracted	Uni-ZAP XR	LP013
HFTA HFTB HFTC HFTD	Human Fetal Dura Mater	Uni-ZAP XR	LP013
HCAA HCAB HCAC	Cem cells, cyclohexamide treated	Uni-ZAP XR	LP013
HRGA HRGB HRGC HRGD	Raji Cells, cyclohexamide treated	Uni-ZAP XR	LP013
HE9A HE9B HE9C HE9D HE9E	Nine Week Old Early Stage Human	Uni-ZAP XR	LP013
HSFA	Human Fibrosarcoma	Uni-ZAP XR	LP013
HATA HATB HATC HATD HATE	Human Adrenal Gland Tumor	Uni-ZAP XR	LP013
HTRA	Human Trachea Tumor	Uni-ZAP XR	LP013
HE2A HE2D HE2E HE2H HE2I	12 Week Old Early Stage Human	Uni-ZAP XR	LP013
HE2B HE2C HE2F HE2G HE2P	12 Week Old Early Stage Human, II	Uni-ZAP XR	LP013
HNEA HNEB HNEC HNED HNEE	Human Neutrophil	Uni-ZAP XR	LP013
HBGA	Human Primary Breast Cancer	Uni-ZAP XR	LP013
HPTS HPTT HPTU	Human Pituitary, subtracted	Uni-ZAP XR	LP013
HMQA HMQB HMQC HMQD	Human Activated Monocytes	Uni-ZAP XR	LP013
HOAA HOAB HOAC	Human Osteosarcoma	Uni-ZAP XR	LP013
HTOA HTOD HTOE HTOF HTOG	human tonsils	Uni-ZAP XR	LP013
HMGB	Human OB MG63 control fraction I	Uni-ZAP XR	LP013
HOPB	Human OB HOS control fraction I	Uni-ZAP XR	LP013
HOQB	Human OB HOS treated (1 nM E2) fraction I	Uni-ZAP XR	LP013
HAUA HAUB HAUC	Amniotic Cells - TNF induced	Uni-ZAP XR	LP013
HAQA HAQB HAQC HAQD	Amniotic Cells - Primary Culture	Uni-ZAP XR	LP013
HROA HROC	HUMAN STOMACH	Uni-ZAP XR	LP013
HBJA HBJB HBJC HBJD HBJE	HUMAN B CELL LYMPHOMA	Uni-ZAP XR	LP013
HODA HODB HODC HODD	human ovarian cancer	Uni-ZAP XR	LP013
HCPA	Corpus Callosum	Uni-ZAP XR	LP013
HSOA	stomach cancer (human)	Uni-ZAP XR	LP013
HERA	SKIN	Uni-ZAP XR	LP013
HMDA	Brain-medulloblastoma	Uni-ZAP XR	LP013
HGLA HGLB HGLD	Glioblastoma	Uni-ZAP XR	LP013

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HWTA HWTB HWTC	wilm's tumor	Uni-ZAP XR	LP013
HEAA	H. Atrophic Endometrium	Uni-ZAP XR	LP013
HAPN HAPO HAPP HAPQ HAPR	Human Adult Pulmonary;re-excision	Uni-ZAP XR	LP013
HLTG HLTH	Human T-cell lymphoma;re-excision	Uni-ZAP XR	LP013
HAHC HAHD HAHE	Human Adult Heart;re-excision	Uni-ZAP XR	LP013
HAGA HAGB HAGC HAGD HAGE	Human Amygdala	Uni-ZAP XR	LP013
HSJA HSJB HSJC	Smooth muscle-ILb induced	Uni-ZAP XR	LP013
HSHA HSHB HSHC	Smooth muscle, IL1b induced	Uni-ZAP XR	LP013
HPWA HPWB HPWC HPWD HPWE	Prostate BPH	Uni-ZAP XR	LP013
HPIA HPIB HPIC	LNCAP prostate cell line	Uni-ZAP XR	LP013
HPJA HPJB HPJC	PC3 Prostate cell line	Uni-ZAP XR	LP013
HBTA	Bone Marrow Stroma, TNF&LPS ind	Uni-ZAP XR	LP013
HMCF HMCG HMCH HMCI HMCJ	Macrophage-oxLDL; re-excision	Uni-ZAP XR	LP013
HAGG HAGH HAGI	Human Amygdala;re-excision	Uni-ZAP XR	LP013
HACA	H. Adipose Tissue	Uni-ZAP XR	LP013
HKFB	K562 + PMA (36 hrs).re-excision	ZAP Express	LP013
HCWT HCWU HCWV	CD34 positive cells (cord blood),re-ex	ZAP Express	LP013
HBWA	Whole brain	ZAP Express	LP013
HBXA HBXB HBXC HBXD	Human Whole Brain #2 - Oligo dT > 1.5Kb	ZAP Express	LP013
HAVM	Temporal cortex-Alzheizmer	pT-Adv	LP014
HAVT	Hippocampus, Alzheimer Subtracted	pT-Adv	LP014
HHAS	CHME Cell Line	Uni-ZAP XR	LP014
HAJR	Larynx normal	pSport 1	LP014
HWLE HWLF HWLG HWLH	Colon Normal	pSport 1	LP014
HCRM HCRN HCRO	Colon Carcinoma	pSport 1	LP014
HWLI HWLJ HWLK	Colon Normal	pSport 1	LP014
HWLQ HWLR HWLS HWLT	Colon Tumor	pSport 1	LP014
HBFM	Gastrocnemius Muscle	pSport 1	LP014
HBOD HBOE	Quadriceps Muscle	pSport 1	LP014
HBKD HBKE	Soleus Muscle	pSport 1	LP014
HCCM	Pancreatic Langerhans	pSport 1	LP014
HWGA	Larynx carcinoma	pSport 1	LP014
HWGM HWGN	Larynx carcinoma	pSport 1	LP014
HWLA HWLB HWLC	Normal colon	pSport 1	LP014
HWLM HWLN	Colon Tumor	pSport 1	LP014
HVAM HVAN HVAO	Pancreas Tumor	pSport 1	LP014
HWGQ	Larynx carcinoma	pSport 1	LP014
HAQM HAQN	Salivary Gland	pSport 1	LP014
HASM	Stomach; normal	pSport 1	LP014
HBCM	Uterus; normal	pSport 1	LP014
HCDM	Testis; normal	pSport 1	LP014
HDJM	Brain; normal	pSport 1	LP014
HEFM	Adrenal Gland,normal	pSport 1	LP014
HBAA	Rectum normal	pSport 1	LP014
HFDM	Rectum tumour	pSport 1	LP014
HGAM	Colon, normal	pSport 1	LP014
HHMM	Colon, tumour	pSport 1	LP014
HCLB HCLC	Human Lung Cancer	Lambda Zap II	LP015
HRLA	L1 Cell line	ZAP Express	LP015

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
HHAM	Hypothalamus, Alzheimer's	pCMVSport 3.0	LP015
HKBA	Ku 812F Basophils Line	pSport 1	LP015
HS2S	Saos2, Dexamethosome Treated	pSport 1	LP016
HA5A	Lung Carcinoma A549 TNFalpha activated	pSport 1	LP016
HTFM	TF-1 Cell Line GM-CSF Treated	pSport 1	LP016
HYAS	Thyroid Tumour	pSport 1	LP016
HUTS	Larynx Normal	pSport 1	LP016
HXOA	Larynx Tumor	pSport 1	LP016
HEAH	Ea.hy.926 cell line	pSport 1	LP016
HINA	Adenocarcinoma Human	pSport 1	LP016
HRMA	Lung Mesothelium	pSport 1	LP016
HLCL	Human Pre-Differentiated Adipocytes	Uni-Zap XR	LP017
HS2A	Saos2 Cells	pSport 1	LP020
HS2I	Saos2 Cells; Vitamin D3 Treated	pSport 1	LP020
HUCM	CHME Cell Line, untreated	pSport 1	LP020
HEPN	Aryepiglottis Normal	pSport 1	LP020
HPSN	Sinus Piniformis Tumour	pSport 1	LP020
HNSA	Stomach Normal	pSport 1	LP020
HNSM	Stomach Tumour	pSport 1	LP020
HNLA	Liver Normal Met5No	pSport 1	LP020
HUTA	Liver Tumour Met 5 Tu	pSport 1	LP020
HOCN	Colon Normal	pSport 1	LP020
HOCT	Colon Tumor	pSport 1	LP020
HTNT	Tongue Tumour	pSport 1	LP020
HLXN	Larynx Normal	pSport 1	LP020
HLXT	Larynx Tumour	pSport 1	LP020
HTYN	Thymus	pSport 1	LP020
HPLN	Placenta	pSport 1	LP020
HTNG	Tongue Normal	pSport 1	LP020
HZAA	Thyroid Normal (SDCA2 No)	pSport 1	LP020
HWES	Thyroid Thyroiditis	pSport 1	LP020
HFHD	Ficolled Human Stromal Cells, 5Fu treated	pTrip1Ex2	LP021
HFHM,HFHN	Ficolled Human Stromal Cells, Untreated	pTrip1Ex2	LP021
HPCI	Hep G2 Cells, lambda library	lambda Zap-CMV XR	LP021
HBCA,HBCB,HBCC	H. Lymph node breast Cancer	Uni-ZAP XR	LP021
HCOK	Chondrocytes	pSPORT1	LP022
HDCA, HDCB, HDCC	Dendritic Cells From CD34 Cells	pSPORT1	LP022
HDMA, HDMB	CD40 activated monocyte dendritic cells	pSPORT1	LP022
HDDM, HDDN, HDDO	LPS activated derived dendritic cells	pSPORT1	LP022
HPCR	Hep G2 Cells, PCR library	lambda Zap-CMV XR	LP022
HAAA, HAAB, HAAC	Lung, Cancer (4005313A3): Invasive Poorly Differentiated Lung Adenocarcinoma	pSPORT1	LP022
HIPA, HIPB, HIPC	Lung, Cancer (4005163 B7): Invasive, Poorly Diff. Adenocarcinoma, Metastatic	pSPORT1	LP022
HOOH, HOOI	Ovary, Cancer: (4004562 B6) Papillary Serous Cystic Neoplasm, Low	pSPORT1	LP022

Libraries owned by Catalog	Catalog Description	Vector	ATCC Deposit
	Malignant Pot		
HIDA	Lung, Normal: (4005313 B1)	pSPORT1	LP022
HUJA,HUJB,HUJC,HUJD,HUJE	B-Cells	pCMVSport 3.0	LP022
HNOA,HNOB,HNOC,HNOD	Ovary, Normal: (9805C040R)	pSPORT1	LP022
HNLM	Lung, Normal: (4005313 B1)	pSPORT1	LP022
HSCL	Stromal Cells	pSPORT1	LP022
HAAX	Lung, Cancer: (4005313 A3) Invasive Poorly-differentiated Metastatic lung adenocarcinoma	pSPORT1	LP022
HUUA,HUUB,HUUC,HUUD	B-cells (unstimulated)	pTrip1Ex2	LP022
HWWA,HWWB,HWWC,HWWD,HWWE,HWWF,HWWG	B-cells (stimulated)	pSPORT1	LP022
HCCC	Colon, Cancer: (9808C064R)	pCMVSport 3.0	LP023
HPDO HPDP HPDQ HPDR HPD	Ovary, Cancer (9809C332): Poorly differentiated adenocarcinoma	pSport 1	LP023
HPCO HPCP HPCQ HPCT	Ovary, Cancer (15395A1F): Grade II Papillary Carcinoma	pSport 1	LP023
HOCM HOCO HOCP HOCQ	Ovary, Cancer: (15799A1F) Poorly differentiated carcinoma	pSport 1	LP023
HCBM HCBN HCBO	Breast, Cancer: (4004943 A5)	pSport 1	LP023
HNBT HNBU HNBV	Breast, Normal: (4005522B2)	pSport 1	LP023
HBCP HBCQ	Breast, Cancer: (4005522 A2)	pSport 1	LP023
HBCJ	Breast, Cancer: (9806C012R)	pSport 1	LP023
HSAM HSAN	Stromal cells 3.88	pSport 1	LP023
HVCA HVCB HVCC HVCD	Ovary, Cancer: (4004332 A2)	pSport 1	LP023
HSCK HSEN HSEO	Stromal cells (HBM3.18)	pSport 1	LP023
HSCP HSCQ	stromal cell clone 2.5	pSport 1	LP023
HUXA	Breast Cancer: (4005385 A2)	pSport 1	LP023
HCOM HCON HCOO HCOP HCOQ	Ovary, Cancer (4004650 A3): Well-Differentiated Micropapillary Serous Carcinoma	pSport 1	LP023
HBNM	Breast, Cancer: (9802C020E)	pSport 1	LP023
HVVA HVVB HVVC HVVD HVVE	Human Bone Marrow, treated	pSport 1	LP023

Two approaches can be used to isolate a particular clone from the deposited sample of plasmid DNAs cited for that clone in Table 5. First, a plasmid is directly isolated by screening the clones using a polynucleotide probe corresponding to the nucleotide sequence of SEQ ID NO:X.

Particularly, a specific polynucleotide with 30-40 nucleotides is synthesized using an Applied Biosystems DNA synthesizer according to the sequence reported. The oligonucleotide is labeled, for instance, with ^{32}P-γ-ATP using T4 polynucleotide kinase and purified according to routine methods. (E.g., Maniatis et al., Molecular Cloning: A Laboratory Manual, Cold Spring Harbor Press, Cold Spring, NY (1982).) The plasmid mixture is transformed into a suitable host, as indicated above (such as XL-1 Blue (Stratagene)) using techniques known to those of skill in the art, such as those provided by the vector supplier or in related publications or patents cited above. The transformants are plated on 1.5% agar plates (containing the appropriate selection agent, e.g., ampicillin) to a density of about 150 transformants (colonies) per plate. These plates are screened using Nylon membranes according to routine methods for bacterial colony screening (e.g., Sambrook et al., Molecular Cloning: A Laboratory Manual, 2nd Edit., (1989), Cold Spring Harbor Laboratory Press, pages 1.93 to 1.104), or other techniques known to those of skill in the art.

Alternatively, two primers of 17-20 nucleotides derived from both ends of the nucleotide sequence of SEQ ID NO:X are synthesized and used to amplify the desired cDNA using the deposited cDNA plasmid as a template. The polymerase chain reaction is carried out under routine conditions, for instance, in 25 µl of reaction mixture with 0.5 ug of the above cDNA template. A convenient reaction mixture is 1.5-5 mM $MgCl_2$, 0.01% (w/v) gelatin, 20 µM each of dATP, dCTP, dGTP, dTTP, 25 pmol of each primer and 0.25 Unit of Taq polymerase. Thirty five cycles of PCR (denaturation at 94°C for 1 min; annealing at 55°C for 1 min; elongation at 72°C for 1 min) are performed with a Perkin-Elmer Cetus automated thermal cycler. The amplified product is analyzed by agarose gel electrophoresis and the DNA band with expected molecular weight is excised and purified. The PCR product is verified to be the selected sequence by subcloning and sequencing the DNA product.

Several methods are available for the identification of the 5' or 3' non-coding portions of a gene which may not be present in the deposited clone. These methods include but are not

limited to, filter probing, clone enrichment using specific probes, and protocols similar or identical to 5' and 3' "RACE" protocols which are well known in the art. For instance, a method similar to 5' RACE is available for generating the missing 5' end of a desired full-length transcript. (Fromont-Racine et al., Nucleic Acids Res. 21(7):1683-1684 (1993).)

Briefly, a specific RNA oligonucleotide is ligated to the 5' ends of a population of RNA presumably containing full-length gene RNA transcripts. A primer set containing a primer specific to the ligated RNA oligonucleotide and a primer specific to a known sequence of the gene of interest is used to PCR amplify the 5' portion of the desired full-length gene. This amplified product may then be sequenced and used to generate the full length gene.

This above method starts with total RNA isolated from the desired source, although poly-A+ RNA can be used. The RNA preparation can then be treated with phosphatase if necessary to eliminate 5' phosphate groups on degraded or damaged RNA which may interfere with the later RNA ligase step. The phosphatase should then be inactivated and the RNA treated with tobacco acid pyrophosphatase in order to remove the cap structure present at the 5' ends of messenger RNAs. This reaction leaves a 5' phosphate group at the 5' end of the cap cleaved RNA which can then be ligated to an RNA oligonucleotide using T4 RNA ligase.

This modified RNA preparation is used as a template for first strand cDNA synthesis using a gene specific oligonucleotide. The first strand synthesis reaction is used as a template for PCR amplification of the desired 5' end using a primer specific to the ligated RNA oligonucleotide and a primer specific to the known sequence of the gene of interest. The resultant product is then sequenced and analyzed to confirm that the 5' end sequence belongs to the desired gene.

Example 2: Isolation of Genomic Clones Corresponding to a Polynucleotide

A human genomic P1 library (Genomic Systems, Inc.) is screened by PCR using primers selected for the sequence corresponding to SEQ ID NO:X, according to the method described in Example 1. (See also, Sambrook.)

Example 3: Tissue specific expression analysis

The Human Genome Sciences, Inc. (HGS) database is derived from sequencing tissue specific cDNA libraries. Libraries generated from a particular tissue are selected and the specific tissue expression pattern of EST groups or assembled contigs within these libraries is determined by comparison of the expression patterns of those groups or contigs within the entire database. ESTs which show tissue specific expression are selected.

The original clone from which the specific EST sequence was generated, is obtained from the catalogued library of clones and the insert amplified by PCR using methods known in the art. The PCR product is denatured then transferred in 96 well format to a nylon membrane (Schleicher and Scheull) generating an array filter of tissue specific clones. Housekeeping genes, maize genes, and known tissue specific genes are included on the filters. These targets can be used in signal normalization and to validate assay sensitivity. Additional targets are included to monitor probe length and specificity of hybridization.

Radioactively labeled hybridization probes are generated by first strand cDNA synthesis per the manufacturer's instructions (Life Technologies) from mRNA/RNA samples prepared from the specific tissue being analyzed. The hybridization probes are purified by gel exclusion chromatography, quantitated, and hybridized with the array filters in hybridization bottles at 65°C overnight. The filters are washed under stringent conditions and signals are captured using a Fuji phosphorimager.

Data is extracted using AIS software and following background subtraction, signal normalization is performed. This includes a normalization of filter-wide expression levels between different experimental runs. Genes that are differentially expressed in the tissue of interest are identified and the full length sequence of these clones is generated.

Example 4: Chromosomal Mapping of the Polynucleotides

An oligonucleotide primer set is designed according to the sequence at the 5' end of SEQ ID NO:X. This primer preferably spans about 100 nucleotides. This primer set is then used in a polymerase chain reaction under the following set of conditions : 30 seconds, 95°C; 1 minute, 56°C; 1 minute, 70°C. This cycle is repeated 32 times followed by one 5 minute

cycle at 70°C. Human, mouse, and hamster DNA is used as template in addition to a somatic cell hybrid panel containing individual chromosomes or chromosome fragments (Bios, Inc). The reactions is analyzed on either 8% polyacrylamide gels or 3.5 % agarose gels. Chromosome mapping is determined by the presence of an approximately 100 bp PCR fragment in the particular somatic cell hybrid.

Example 5: Bacterial Expression of a Polypeptide

A polynucleotide encoding a polypeptide of the present invention is amplified using PCR oligonucleotide primers corresponding to the 5' and 3' ends of the DNA sequence, as outlined in Example 1, to synthesize insertion fragments. The primers used to amplify the cDNA insert should preferably contain restriction sites, such as BamHI and XbaI, at the 5' end of the primers in order to clone the amplified product into the expression vector. For example, BamHI and XbaI correspond to the restriction enzyme sites on the bacterial expression vector pQE-9. (Qiagen, Inc., Chatsworth, CA). This plasmid vector encodes antibiotic resistance (Amp^r), a bacterial origin of replication (ori), an IPTG-regulatable promoter/operator (P/O), a ribosome binding site (RBS), a 6-histidine tag (6-His), and restriction enzyme cloning sites.

The pQE-9 vector is digested with BamHI and XbaI and the amplified fragment is ligated into the pQE-9 vector maintaining the reading frame initiated at the bacterial RBS. The ligation mixture is then used to transform the E. coli strain M15/rep4 (Qiagen, Inc.) which contains multiple copies of the plasmid pREP4, which expresses the lacI repressor and also confers kanamycin resistance (Kan^r). Transformants are identified by their ability to grow on LB plates and ampicillin/kanamycin resistant colonies are selected. Plasmid DNA is isolated and confirmed by restriction analysis.

Clones containing the desired constructs are grown overnight (O/N) in liquid culture in LB media supplemented with both Amp (100 ug/ml) and Kan (25 ug/ml). The O/N culture is used to inoculate a large culture at a ratio of 1:100 to 1:250. The cells are grown to an optical density 600 ($O.D._{600}$) of between 0.4 and 0.6. IPTG (Isopropyl-B-D-thiogalacto pyranoside) is then added to a final concentration of 1 mM. IPTG induces by inactivating the lacI repressor, clearing the P/O leading to increased gene expression.

Cells are grown for an extra 3 to 4 hours. Cells are then harvested by centrifugation (20 mins at 6000Xg). The cell pellet is solubilized in the chaotropic agent 6 Molar Guanidine HCl by stirring for 3-4 hours at 4°C. The cell debris is removed by centrifugation, and the supernatant containing the polypeptide is loaded onto a nickel-nitrilo-tri-acetic acid ("Ni-NTA") affinity resin column (available from QIAGEN, Inc., *supra*). Proteins with a 6 x His tag bind to the Ni-NTA resin with high affinity and can be purified in a simple one-step procedure (for details see: The QIAexpressionist (1995) QIAGEN, Inc., *supra*).

Briefly, the supernatant is loaded onto the column in 6 M guanidine-HCl, pH 8, the column is first washed with 10 volumes of 6 M guanidine-HCl, pH 8, then washed with 10 volumes of 6 M guanidine-HCl pH 6, and finally the polypeptide is eluted with 6 M guanidine-HCl, pH 5.

The purified protein is then renatured by dialyzing it against phosphate-buffered saline (PBS) or 50 mM Na-acetate, pH 6 buffer plus 200 mM NaCl. Alternatively, the protein can be successfully refolded while immobilized on the Ni-NTA column. The recommended conditions are as follows: renature using a linear 6M-1M urea gradient in 500 mM NaCl, 20% glycerol, 20 mM Tris/HCl pH 7.4, containing protease inhibitors. The renaturation should be performed over a period of 1.5 hours or more. After renaturation the proteins are eluted by the addition of 250 mM immidazole. Immidazole is removed by a final dialyzing step against PBS or 50 mM sodium acetate pH 6 buffer plus 200 mM NaCl. The purified protein is stored at 4° C or frozen at -80° C.

In addition to the above expression vector, the present invention further includes an expression vector comprising phage operator and promoter elements operatively linked to a polynucleotide of the present invention, called pHE4a. (ATCC Accession Number 209645, deposited on February 25, 1998.) This vector contains: 1) a neomycinphosphotransferase gene as a selection marker, 2) an E. coli origin of replication, 3) a T5 phage promoter sequence, 4) two lac operator sequences, 5) a Shine-Delgarno sequence, and 6) the lactose operon repressor gene (lacIq). The origin of replication (oriC) is derived from pUC19 (LTI, Gaithersburg, MD). The promoter sequence and operator sequences are made synthetically.

DNA can be inserted into the pHEa by restricting the vector with NdeI and XbaI, BamHI, XhoI, or Asp718, running the restricted product on a gel, and isolating the larger fragment (the stuffer fragment should be about 310 base pairs). The DNA insert is generated according to the PCR protocol described in Example 1, using PCR primers having restriction

sites for NdeI (5' primer) and XbaI, BamHI, XhoI, or Asp718 (3' primer). The PCR insert is gel purified and restricted with compatible enzymes. The insert and vector are ligated according to standard protocols.

The engineered vector could easily be substituted in the above protocol to express protein in a bacterial system.

Example 6: Purification of a Polypeptide from an Inclusion Body

The following alternative method can be used to purify a polypeptide expressed in *E coli* when it is present in the form of inclusion bodies. Unless otherwise specified, all of the following steps are conducted at 4-10°C.

Upon completion of the production phase of the *E. coli* fermentation, the cell culture is cooled to 4-10°C and the cells harvested by continuous centrifugation at 15,000 rpm (Heraeus Sepatech). On the basis of the expected yield of protein per unit weight of cell paste and the amount of purified protein required, an appropriate amount of cell paste, by weight, is suspended in a buffer solution containing 100 mM Tris, 50 mM EDTA, pH 7.4. The cells are dispersed to a homogeneous suspension using a high shear mixer.

The cells are then lysed by passing the solution through a microfluidizer (Microfuidics, Corp. or APV Gaulin, Inc.) twice at 4000-6000 psi. The homogenate is then mixed with NaCl solution to a final concentration of 0.5 M NaCl, followed by centrifugation at 7000 xg for 15 min. The resultant pellet is washed again using 0.5M NaCl, 100 mM Tris, 50 mM EDTA, pH 7.4.

The resulting washed inclusion bodies are solubilized with 1.5 M guanidine hydrochloride (GuHCl) for 2-4 hours. After 7000 xg centrifugation for 15 min., the pellet is discarded and the polypeptide containing supernatant is incubated at 4°C overnight to allow further GuHCl extraction.

Following high speed centrifugation (30,000 xg) to remove insoluble particles, the GuHCl solubilized protein is refolded by quickly mixing the GuHCl extract with 20 volumes of buffer containing 50 mM sodium, pH 4.5, 150 mM NaCl, 2 mM EDTA by vigorous stirring. The refolded diluted protein solution is kept at 4°C without mixing for 12 hours prior to further purification steps.

To clarify the refolded polypeptide solution, a previously prepared tangential filtration unit equipped with 0.16 μm membrane filter with appropriate surface area (e.g., Filtron), equilibrated with 40 mM sodium acetate, pH 6.0 is employed. The filtered sample is loaded onto a cation exchange resin (e.g., Poros HS-50, Perseptive Biosystems). The column is washed with 40 mM sodium acetate, pH 6.0 and eluted with 250 mM, 500 mM, 1000 mM, and 1500 mM NaCl in the same buffer, in a stepwise manner. The absorbance at 280 nm of the effluent is continuously monitored. Fractions are collected and further analyzed by SDS-PAGE.

Fractions containing the polypeptide are then pooled and mixed with 4 volumes of water. The diluted sample is then loaded onto a previously prepared set of tandem columns of strong anion (Poros HQ-50, Perseptive Biosystems) and weak anion (Poros CM-20, Perseptive Biosystems) exchange resins. The columns are equilibrated with 40 mM sodium acetate, pH 6.0. Both columns are washed with 40 mM sodium acetate, pH 6.0, 200 mM NaCl. The CM-20 column is then eluted using a 10 column volume linear gradient ranging from 0.2 M NaCl, 50 mM sodium acetate, pH 6.0 to 1.0 M NaCl, 50 mM sodium acetate, pH 6.5. Fractions are collected under constant A_{280} monitoring of the effluent. Fractions containing the polypeptide (determined, for instance, by 16% SDS-PAGE) are then pooled.

The resultant polypeptide should exhibit greater than 95% purity after the above refolding and purification steps. No major contaminant bands should be observed from Commassie blue stained 16% SDS-PAGE gel when 5 μg of purified protein is loaded. The purified protein can also be tested for endotoxin/LPS contamination, and typically the LPS content is less than 0.1 ng/ml according to LAL assays.

Example 7: Cloning and Expression of a Polypeptide in a Baculovirus Expression System

In this example, the plasmid shuttle vector pA2 is used to insert a polynucleotide into a baculovirus to express a polypeptide. This expression vector contains the strong polyhedrin promoter of the *Autographa californica* nuclear polyhedrosis virus (AcMNPV) followed by convenient restriction sites such as BamHI, Xba I and Asp718. The polyadenylation site of the simian virus 40 ("SV40") is used for efficient polyadenylation. For easy selection of recombinant virus, the plasmid contains the beta-galactosidase gene from *E. coli* under

control of a weak Drosophila promoter in the same orientation, followed by the polyadenylation signal of the polyhedrin gene. The inserted genes are flanked on both sides by viral sequences for cell-mediated homologous recombination with wild-type viral DNA to generate a viable virus that express the cloned polynucleotide.

Many other baculovirus vectors can be used in place of the vector above, such as pAc373, pVL941, and pAcIM1, as one skilled in the art would readily appreciate, as long as the construct provides appropriately located signals for transcription, translation, secretion and the like, including a signal peptide and an in-frame AUG as required. Such vectors are described, for instance, in Luckow et al., Virology 170:31-39 (1989).

Specifically, the cDNA sequence contained in the deposited clone, including the AUG initiation codon, is amplified using the PCR protocol described in Example 1. If a naturally occurring signal sequence is used to produce the polypeptide of the present invention, the pA2 vector does not need a second signal peptide. Alternatively, the vector can be modified (pA2 GP) to include a baculovirus leader sequence, using the standard methods described in Summers et al., "A Manual of Methods for Baculovirus Vectors and Insect Cell Culture Procedures," Texas Agricultural Experimental Station Bulletin No. 1555 (1987).

The amplified fragment is isolated from a 1% agarose gel using a commercially available kit ("Geneclean," BIO 101 Inc., La Jolla, Ca.). The fragment then is digested with appropriate restriction enzymes and again purified on a 1% agarose gel.

The plasmid is digested with the corresponding restriction enzymes and optionally, can be dephosphorylated using calf intestinal phosphatase, using routine procedures known in the art. The DNA is then isolated from a 1% agarose gel using a commercially available kit ("Geneclean" BIO 101 Inc., La Jolla, Ca.).

The fragment and the dephosphorylated plasmid are ligated together with T4 DNA ligase. *E. coli* HB101 or other suitable *E. coli* hosts such as XL-1 Blue (Stratagene Cloning Systems, La Jolla, CA) cells are transformed with the ligation mixture and spread on culture plates. Bacteria containing the plasmid are identified by digesting DNA from individual colonies and analyzing the digestion product by gel electrophoresis. The sequence of the cloned fragment is confirmed by DNA sequencing.

Five μg of a plasmid containing the polynucleotide is co-transfected with 1.0 μg of a commercially available linearized baculovirus DNA ("BaculoGold™ baculovirus DNA",

Pharmingen, San Diego, CA), using the lipofection method described by Felgner et al., Proc. Natl. Acad. Sci. USA 84:7413-7417 (1987). One μg of BaculoGold™ virus DNA and 5 μg of the plasmid are mixed in a sterile well of a microtiter plate containing 50 μl of serum-free Grace's medium (Life Technologies Inc., Gaithersburg, MD). Afterwards, 10 μl Lipofectin plus 90 μl Grace's medium are added, mixed and incubated for 15 minutes at room temperature. Then the transfection mixture is added drop-wise to Sf9 insect cells (ATCC CRL 1711) seeded in a 35 mm tissue culture plate with 1 ml Grace's medium without serum. The plate is then incubated for 5 hours at 27° C. The transfection solution is then removed from the plate and 1 ml of Grace's insect medium supplemented with 10% fetal calf serum is added. Cultivation is then continued at 27° C for four days.

After four days the supernatant is collected and a plaque assay is performed, as described by Summers and Smith, *supra*. An agarose gel with "Blue Gal" (Life Technologies Inc., Gaithersburg) is used to allow easy identification and isolation of gal-expressing clones, which produce blue-stained plaques. (A detailed description of a "plaque assay" of this type can also be found in the user's guide for insect cell culture and baculovirology distributed by Life Technologies Inc., Gaithersburg, page 9-10.) After appropriate incubation, blue stained plaques are picked with the tip of a micropipettor (e.g., Eppendorf). The agar containing the recombinant viruses is then resuspended in a microcentrifuge tube containing 200 μl of Grace's medium and the suspension containing the recombinant baculovirus is used to infect Sf9 cells seeded in 35 mm dishes. Four days later the supernatants of these culture dishes are harvested and then they are stored at 4° C.

To verify the expression of the polypeptide, Sf9 cells are grown in Grace's medium supplemented with 10% heat-inactivated FBS. The cells are infected with the recombinant baculovirus containing the polynucleotide at a multiplicity of infection ("MOI") of about 2. If radiolabeled proteins are desired, 6 hours later the medium is removed and is replaced with SF900 II medium minus methionine and cysteine (available from Life Technologies Inc., Rockville, MD). After 42 hours, 5 μCi of ^{35}S-methionine and 5 μCi ^{35}S-cysteine (available from Amersham) are added. The cells are further incubated for 16 hours and then are harvested by centrifugation. The proteins in the supernatant as well as the intracellular proteins are analyzed by SDS-PAGE followed by autoradiography (if radiolabeled).

Microsequencing of the amino acid sequence of the amino terminus of purified protein may be used to determine the amino terminal sequence of the produced protein.

Example 8: Expression of a Polypeptide in Mammalian Cells

The polypeptide of the present invention can be expressed in a mammalian cell. A typical mammalian expression vector contains a promoter element, which mediates the initiation of transcription of mRNA, a protein coding sequence, and signals required for the termination of transcription and polyadenylation of the transcript. Additional elements include enhancers, Kozak sequences and intervening sequences flanked by donor and acceptor sites for RNA splicing. Highly efficient transcription is achieved with the early and late promoters from SV40, the long terminal repeats (LTRs) from Retroviruses, e.g., RSV, HTLVI, HIVI and the early promoter of the cytomegalovirus (CMV). However, cellular elements can also be used (e.g., the human actin promoter).

Suitable expression vectors for use in practicing the present invention include, for example, vectors such as pSVL and pMSG (Pharmacia, Uppsala, Sweden), pRSVcat (ATCC 37152), pSV2dhfr (ATCC 37146), pBC12MI (ATCC 67109), pCMVSport 2.0, and pCMVSport 3.0. Mammalian host cells that could be used include, human Hela, 293, H9 and Jurkat cells, mouse NIH3T3 and C127 cells, Cos 1, Cos 7 and CV1, quail QC1-3 cells, mouse L cells and Chinese hamster ovary (CHO) cells.

Alternatively, the polypeptide can be expressed in stable cell lines containing the polynucleotide integrated into a chromosome. The co-transfection with a selectable marker such as DHFR, gpt, neomycin, hygromycin allows the identification and isolation of the transfected cells.

The transfected gene can also be amplified to express large amounts of the encoded protein. The DHFR (dihydrofolate reductase) marker is useful in developing cell lines that carry several hundred or even several thousand copies of the gene of interest. (See, e.g., Alt, F. W., et al., J. Biol. Chem. 253:1357-1370 (1978); Hamlin, J. L. and Ma, C., Biochem. et Biophys. Acta, 1097:107-143 (1990); Page, M. J. and Sydenham, M. A., Biotechnology 9:64-68 (1991).) Another useful selection marker is the enzyme glutamine synthase (GS) (Murphy et al., Biochem J. 227:277-279 (1991); Bebbington et al., Bio/Technology 10:169-175 (1992). Using these markers, the mammalian cells are grown in selective medium and the cells with the highest resistance are selected. These cell lines contain the amplified gene(s) integrated into a chromosome. Chinese hamster ovary (CHO) and NSO cells are often used

for the production of proteins.

Derivatives of the plasmid pSV2-dhfr (ATCC Accession No. 37146), the expression vectors pC4 (ATCC Accession No. 209646) and pC6 (ATCC Accession No.209647) contain the strong promoter (LTR) of the Rous Sarcoma Virus (Cullen et al., Molecular and Cellular Biology, 438-447 (March, 1985)) plus a fragment of the CMV-enhancer (Boshart et al., Cell 41:521-530 (1985).) Multiple cloning sites, e.g., with the restriction enzyme cleavage sites BamHI, XbaI and Asp718, facilitate the cloning of the gene of interest. The vectors also contain the 3' intron, the polyadenylation and termination signal of the rat preproinsulin gene, and the mouse DHFR gene under control of the SV40 early promoter.

Specifically, the plasmid pC6, for example, is digested with appropriate restriction enzymes and then dephosphorylated using calf intestinal phosphates by procedures known in the art. The vector is then isolated from a 1% agarose gel.

A polynucleotide of the present invention is amplified according to the protocol outlined in Example 1. If a naturally occurring signal sequence is used to produce the polypeptide of the present invention, the vector does not need a second signal peptide. Alternatively, if a naturally occurring signal sequence is not used, the vector can be modified to include a heterologous signal sequence. (See, e.g., WO 96/34891.)

The amplified fragment is isolated from a 1% agarose gel using a commercially available kit ("Geneclean," BIO 101 Inc., La Jolla, Ca.). The fragment then is digested with appropriate restriction enzymes and again purified on a 1% agarose gel.

The amplified fragment is then digested with the same restriction enzyme and purified on a 1% agarose gel. The isolated fragment and the dephosphorylated vector are then ligated with T4 DNA ligase. *E. coli* HB101 or XL-1 Blue cells are then transformed and bacteria are identified that contain the fragment inserted into plasmid pC6 using, for instance, restriction enzyme analysis.

Chinese hamster ovary cells lacking an active DHFR gene is used for transfection. Five μg of the expression plasmid pC6 or pC4 is cotransfected with 0.5 μg of the plasmid pSVneo using lipofectin (Felgner et al., *supra*). The plasmid pSV2-neo contains a dominant selectable marker, the *neo* gene from Tn5 encoding an enzyme that confers resistance to a group of antibiotics including G418. The cells are seeded in alpha minus MEM supplemented with 1 mg/ml G418. After 2 days, the cells are trypsinized and seeded in hybridoma cloning plates (Greiner, Germany) in alpha minus MEM supplemented with 10,

25, or 50 ng/ml of metothrexate plus 1 mg/ml G418. After about 10-14 days single clones are trypsinized and then seeded in 6-well petri dishes or 10 ml flasks using different concentrations of methotrexate (50 nM, 100 nM, 200 nM, 400 nM, 800 nM). Clones growing at the highest concentrations of methotrexate are then transferred to new 6-well plates containing even higher concentrations of methotrexate (1 μM, 2 μM, 5 μM, 10 mM, 20 mM). The same procedure is repeated until clones are obtained which grow at a concentration of 100 - 200 μM. Expression of the desired gene product is analyzed, for instance, by SDS-PAGE and Western blot or by reversed phase HPLC analysis.

Example 9: Protein Fusions

The polypeptides of the present invention are preferably fused to other proteins. These fusion proteins can be used for a variety of applications. For example, fusion of the present polypeptides to His-tag, HA-tag, protein A, IgG domains, and maltose binding protein facilitates purification. (See Example 5; see also EP A 394,827; Traunecker, et al., Nature 331:84-86 (1988).) Similarly, fusion to IgG-1, IgG-3, and albumin increases the halflife time in vivo. Nuclear localization signals fused to the polypeptides of the present invention can target the protein to a specific subcellular localization, while covalent heterodimer or homodimers can increase or decrease the activity of a fusion protein. Fusion proteins can also create chimeric molecules having more than one function. Finally, fusion proteins can increase solubility and/or stability of the fused protein compared to the non-fused protein. All of the types of fusion proteins described above can be made by modifying the following protocol, which outlines the fusion of a polypeptide to an IgG molecule, or the protocol described in Example 5.

Briefly, the human Fc portion of the IgG molecule can be PCR amplified, using primers that span the 5' and 3' ends of the sequence described below. These primers also should have convenient restriction enzyme sites that will facilitate cloning into an expression vector, preferably a mammalian expression vector.

For example, if pC4 (Accession No. 209646) is used, the human Fc portion can be ligated into the BamHI cloning site. Note that the 3' BamHI site should be destroyed. Next, the vector containing the human Fc portion is re-restricted with BamHI, linearizing the

vector, and a polynucleotide of the present invention, isolated by the PCR protocol described in Example 1, is ligated into this BamHI site. Note that the polynucleotide is cloned without a stop codon, otherwise a fusion protein will not be produced.

If the naturally occurring signal sequence is used to produce the polypeptide of the present invention, pC4 does not need a second signal peptide. Alternatively, if the naturally occurring signal sequence is not used, the vector can be modified to include a heterologous signal sequence. (See, e.g., WO 96/34891.)

Human IgG Fc region:

GGGATCCGGAGCCCAAATCTTCTGACAAAACTCACACATGCCCACCGTGCCCAG
CACCTGAATTCGAGGGTGCACCGTCAGTCTTCCTCTTCCCCCCAAAACCCAAGGA
CACCCTCATGATCTCCCGGACTCCTGAGGTCACATGCGTGGTGGTGGACGTAAGC
CACGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCAT
AATGCCAAGACAAAGCCGCGGGAGGAGCAGTACAACAGCACGTACCGTGTGGTC
AGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAGTGC
AAGGTCTCCAACAAAGCCCTCCCAACCCCCATCGAGAAAACCATCTCCAAAGCC
AAAGGGCAGCCCCGAGAACCACAGGTGTACACCCTGCCCCCATCCCGGGATGAG
CTGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATCCAAGC
GACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGAC
CACGCCTCCCGTGCTGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACC
GTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTCCGTGATGCAT
GAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAAT
GAGTGCGACGGCCGCGACTCTAGAGGAT (SEQ ID NO:837)

Example 10: Production of an Antibody from a Polypeptide

a) Hybridoma Technology

The antibodies of the present invention can be prepared by a variety of methods. (See, Current Protocols, Chapter 2.) As one example of such methods, cells expressing polypeptide of the present invention are administered to an animal to induce the production of sera containing polyclonal antibodies. In a preferred method, a preparation of polypeptide

of the present invention is prepared and purified to render it substantially free of natural contaminants. Such a preparation is then introduced into an animal in order to produce polyclonal antisera of greater specific activity.

Monoclonal antibodies specific for polypeptide of the present invention are prepared using hybridoma technology. (Kohler et al., Nature 256:495 (1975); Kohler et al., Eur. J. Immunol. 6:511 (1976); Kohler et al., Eur. J. Immunol. 6:292 (1976); Hammerling et al., in: Monoclonal Antibodies and T-Cell Hybridomas, Elsevier, N.Y., pp. 563-681 (1981)). In general, an animal (preferably a mouse) is immunized with polypeptide of the present invention or, more preferably, with a secreted polypeptide of the present invention-expressing cell. Such polypeptide-expressing cells are cultured in any suitable tissue culture medium, preferably in Earle's modified Eagle's medium supplemented with 10% fetal bovine serum (inactivated at about 56°C), and supplemented with about 10 g/l of nonessential amino acids, about 1,000 U/ml of penicillin, and about 100 µg/ml of streptomycin.

The splenocytes of such mice are extracted and fused with a suitable myeloma cell line. Any suitable myeloma cell line may be employed in accordance with the present invention; however, it is preferable to employ the parent myeloma cell line (SP2O), available from the ATCC. After fusion, the resulting hybridoma cells are selectively maintained in HAT medium, and then cloned by limiting dilution as described by Wands et al. (Gastroenterology 80:225-232 (1981)). The hybridoma cells obtained through such a selection are then assayed to identify clones which secrete antibodies capable of binding the polypeptide of the present invention.

Alternatively, additional antibodies capable of binding to polypeptide of the present invention can be produced in a two-step procedure using anti-idiotypic antibodies. Such a method makes use of the fact that antibodies are themselves antigens, and therefore, it is possible to obtain an antibody which binds to a second antibody. In accordance with this method, protein specific antibodies are used to immunize an animal, preferably a mouse. The splenocytes of such an animal are then used to produce hybridoma cells, and the hybridoma cells are screened to identify clones which produce an antibody whose ability to bind to the polypeptide of the present invention-specific antibody can be blocked by polypeptide of the present invention. Such antibodies comprise anti-idiotypic antibodies to the polypeptide of the present invention-specific antibody and are used to immunize an animal to induce formation of further polypeptide of the present invention-specific antibodies.

For in vivo use of antibodies in humans, an antibody is "humanized". Such antibodies can be produced using genetic constructs derived from hybridoma cells producing the monoclonal antibodies described above. Methods for producing chimeric and humanized antibodies are known in the art and are discussed herein. (See, for review, Morrison, Science 229:1202 (1985); Oi et al., BioTechniques 4:214 (1986); Cabilly et al., U.S. Patent No. 4,816,567; Taniguchi et al., EP 171496; Morrison et al., EP 173494; Neuberger et al., WO 8601533; Robinson et al., WO 8702671; Boulianne et al., Nature 312:643 (1984); Neuberger et al., Nature 314:268 (1985).)

b) Isolation Of Antibody Fragments Directed Against Polypeptide of the Present Invention From A Library Of scFvs

Naturally occurring V-genes isolated from human PBLs are constructed into a library of antibody fragments which contain reactivities against polypeptide of the present invention to which the donor may or may not have been exposed (see e.g., U.S. Patent 5,885,793 incorporated herein by reference in its entirety).

Rescue of the Library. A library of scFvs is constructed from the RNA of human PBLs as described in PCT publication WO 92/01047. To rescue phage displaying antibody fragments, approximately 109 E. coli harboring the phagemid are used to inoculate 50 ml of 2xTY containing 1% glucose and 100 μg/ml of ampicillin (2xTY-AMP-GLU) and grown to an O.D. of 0.8 with shaking. Five ml of this culture is used to innoculate 50 ml of 2xTY-AMP-GLU, 2 x 108 TU of delta gene 3 helper (M13 delta gene III, see PCT publication WO 92/01047) are added and the culture incubated at 37°C for 45 minutes without shaking and then at 37°C for 45 minutes with shaking. The culture is centrifuged at 4000 r.p.m. for 10 min. and the pellet resuspended in 2 liters of 2xTY containing 100 μg/ml ampicillin and 50 ug/ml kanamycin and grown overnight. Phage are prepared as described in PCT publication WO 92/01047.

M13 delta gene III is prepared as follows: M13 delta gene III helper phage does not encode gene III protein, hence the phage(mid) displaying antibody fragments have a greater avidity of binding to antigen. Infectious M13 delta gene III particles are made by growing the helper phage in cells harboring a pUC19 derivative supplying the wild type gene III protein during phage morphogenesis. The culture is incubated for 1 hour at 37° C without shaking and then for a further hour at 37°C with shaking. Cells are spun down (IEC-Centra

8,400 r.p.m. for 10 min), resuspended in 300 ml 2xTY broth containing 100 μg ampicillin/ml and 25 μg kanamycin/ml (2xTY-AMP-KAN) and grown overnight, shaking at 37°C. Phage particles are purified and concentrated from the culture medium by two PEG-precipitations (Sambrook et al., 1990), resuspended in 2 ml PBS and passed through a 0.45 μm filter (Minisart NML; Sartorius) to give a final concentration of approximately 1013 transducing units/ml (ampicillin-resistant clones).

Panning of the Library. Immunotubes (Nunc) are coated overnight in PBS with 4 ml of either 100 μg/ml or 10 μg/ml of a polypeptide of the present invention. Tubes are blocked with 2% Marvel-PBS for 2 hours at 37°C and then washed 3 times in PBS. Approximately 1013 TU of phage is applied to the tube and incubated for 30 minutes at room temperature tumbling on an over and under turntable and then left to stand for another 1.5 hours. Tubes are washed 10 times with PBS 0.1% Tween-20 and 10 times with PBS. Phage are eluted by adding 1 ml of 100 mM triethylamine and rotating 15 minutes on an under and over turntable after which the solution is immediately neutralized with 0.5 ml of 1.0M Tris-HCl, pH 7.4. Phage are then used to infect 10 ml of mid-log E. coli TG1 by incubating eluted phage with bacteria for 30 minutes at 37°C. The E. coli are then plated on TYE plates containing 1% glucose and 100 μg/ml ampicillin. The resulting bacterial library is then rescued with delta gene 3 helper phage as described above to prepare phage for a subsequent round of selection. This process is then repeated for a total of 4 rounds of affinity purification with tube-washing increased to 20 times with PBS, 0.1% Tween-20 and 20 times with PBS for rounds 3 and 4.

Characterization of Binders. Eluted phage from the 3rd and 4th rounds of selection are used to infect E. coli HB 2151 and soluble scFv is produced (Marks, et al., 1991) from single colonies for assay. ELISAs are performed with microtitre plates coated with either 10 pg/ml of the polypeptide of the present invention in 50 mM bicarbonate pH 9.6. Clones positive in ELISA are further characterized by PCR fingerprinting (see, e.g., PCT publication WO 92/01047) and then by sequencing. These ELISA positive clones may also be further characterized by techniques known in the art, such as, for example, epitope mapping, binding affinity, receptor signal transduction, ability to block or competitively inhibit antibody/antigen binding, and competitive agonistic or antagonistic activity.

Example 11: Method of Determining Alterations in a Gene Corresponding to a Polynucleotide

RNA isolated from entire families or individual patients presenting with a phenotype of interest (such as a disease) is be isolated. cDNA is then generated from these RNA samples using protocols known in the art. (See, Sambrook.) The cDNA is then used as a template for PCR, employing primers surrounding regions of interest in SEQ ID NO:X; and/or the nucleotide sequence of the related cDNA in the cDNA clone contained in a deposited library. Suggested PCR conditions consist of 35 cycles at 95 degrees C for 30 seconds; 60-120 seconds at 52-58 degrees C; and 60-120 seconds at 70 degrees C, using buffer solutions described in Sidransky et al., Science 252:706 (1991).

PCR products are then sequenced using primers labeled at their 5' end with T4 polynucleotide kinase, employing SequiTherm Polymerase. (Epicentre Technologies). The intron-exon borders of selected exons is also determined and genomic PCR products analyzed to confirm the results. PCR products harboring suspected mutations is then cloned and sequenced to validate the results of the direct sequencing.

PCR products is cloned into T-tailed vectors as described in Holton et al., Nucleic Acids Research, 19:1156 (1991) and sequenced with T7 polymerase (United States Biochemical). Affected individuals are identified by mutations not present in unaffected individuals.

Genomic rearrangements are also observed as a method of determining alterations in a gene corresponding to a polynucleotide. Genomic clones isolated according to Example 2 are nick-translated with digoxigenindeoxy-uridine 5'-triphosphate (Boehringer Manheim), and FISH performed as described in Johnson et al., Methods Cell Biol. 35:73-99 (1991). Hybridization with the labeled probe is carried out using a vast excess of human cot-1 DNA for specific hybridization to the corresponding genomic locus.

Chromosomes are counterstained with 4,6-diamino-2-phenylidole and propidium iodide, producing a combination of C- and R-bands. Aligned images for precise mapping are obtained using a triple-band filter set (Chroma Technology, Brattleboro, VT) in combination with a cooled charge-coupled device camera (Photometrics, Tucson, AZ) and variable excitation wavelength filters. (Johnson et al., Genet. Anal. Tech. Appl., 8:75 (1991).) Image

collection, analysis and chromosomal fractional length measurements are performed using the ISee Graphical Program System. (Inovision Corporation, Durham, NC.) Chromosome alterations of the genomic region hybridized by the probe are identified as insertions, deletions, and translocations. These alterations are used as a diagnostic marker for an associated disease.

Example 12: Method of Detecting Abnormal Levels of a Polypeptide in a Biological Sample

A polypeptide of the present invention can be detected in a biological sample, and if an increased or decreased level of the polypeptide is detected, this polypeptide is a marker for a particular phenotype. Methods of detection are numerous, and thus, it is understood that one skilled in the art can modify the following assay to fit their particular needs.

For example, antibody-sandwich ELISAs are used to detect polypeptides in a sample, preferably a biological sample. Wells of a microtiter plate are coated with specific antibodies, at a final concentration of 0.2 to 10 ug/ml. The antibodies are either monoclonal or polyclonal and are produced by the method described in Example 10. The wells are blocked so that non-specific binding of the polypeptide to the well is reduced.

The coated wells are then incubated for > 2 hours at RT with a sample containing the polypeptide. Preferably, serial dilutions of the sample should be used to validate results. The plates are then washed three times with deionized or distilled water to remove unbounded polypeptide.

Next, 50 ul of specific antibody-alkaline phosphatase conjugate, at a concentration of 25-400 ng, is added and incubated for 2 hours at room temperature. The plates are again washed three times with deionized or distilled water to remove unbounded conjugate.

Add 75 ul of 4-methylumbelliferyl phosphate (MUP) or p-nitrophenyl phosphate (NPP) substrate solution to each well and incubate 1 hour at room temperature. Measure the reaction by a microtiter plate reader. Prepare a standard curve, using serial dilutions of a control sample, and plot polypeptide concentration on the X-axis (log scale) and fluorescence or absorbance of the Y-axis (linear scale). Interpolate the concentration of the polypeptide in the sample using the standard curve.

Example 13: Formulation

The invention also provides methods of treatment and/or prevention of diseases or disorders (such as, for example, any one or more of the diseases or disorders disclosed herein) by administration to a subject of an effective amount of a Therapeutic. By therapeutic is meant a polynucleotides or polypeptides of the invention (including fragments and variants), agonists or antagonists thereof, and/or antibodies thereto, in combination with a pharmaceutically acceptable carrier type (e.g., a sterile carrier).

The Therapeutic will be formulated and dosed in a fashion consistent with good medical practice, taking into account the clinical condition of the individual patient (especially the side effects of treatment with the Therapeutic alone), the site of delivery, the method of administration, the scheduling of administration, and other factors known to practitioners. The "effective amount" for purposes herein is thus determined by such considerations.

As a general proposition, the total pharmaceutically effective amount of the Therapeutic administered parenterally per dose will be in the range of about 1ug/kg/day to 10 mg/kg/day of patient body weight, although, as noted above, this will be subject to therapeutic discretion. More preferably, this dose is at least 0.01 mg/kg/day, and most preferably for humans between about 0.01 and 1 mg/kg/day for the hormone. If given continuously, the Therapeutic is typically administered at a dose rate of about 1 ug/kg/hour to about 50 ug/kg/hour, either by 1-4 injections per day or by continuous subcutaneous infusions, for example, using a mini-pump. An intravenous bag solution may also be employed. The length of treatment needed to observe changes and the interval following treatment for responses to occur appears to vary depending on the desired effect.

Therapeutics can be are administered orally, rectally, parenterally, intracistemally, intravaginally, intraperitoneally, topically (as by powders, ointments, gels, drops or transdermal patch), bucally, or as an oral or nasal spray. "Pharmaceutically acceptable carrier" refers to a non-toxic solid, semisolid or liquid filler, diluent, encapsulating material or formulation auxiliary of any. The term "parenteral" as used herein refers to modes of administration which include intravenous, intramuscular, intraperitoneal, intrasternal, subcutaneous and intraarticular injection and infusion.

Therapeutics of the invention are also suitably administered by sustained-release systems. Suitable examples of sustained-release Therapeutics are administered orally, rectally, parenterally, intracistemally, intravaginally, intraperitoneally, topically (as by powders, ointments, gels, drops or transdermal patch), bucally, or as an oral or nasal spray. "Pharmaceutically acceptable carrier" refers to a non-toxic solid, semisolid or liquid filler, diluent, encapsulating material or formulation auxiliary of any type. The term "parenteral" as used herein refers to modes of administration which include intravenous, intramuscular, intraperitoneal, intrasternal, subcutaneous and intraarticular injection and infusion.

Therapeutics of the invention are also suitably administered by sustained-release systems. Suitable examples of sustained-release Therapeutics include suitable polymeric materials (such as, for example, semi-permeable polymer matrices in the form of shaped articles, e.g., films, or mirocapsules), suitable hydrophobic materials (for example as an emulsion in an acceptable oil) or ion exchange resins, and sparingly soluble derivatives (such as, for example, a sparingly soluble salt).

Sustained-release matrices include polylactides (U.S. Pat. No. 3,773,919, EP 58,481), copolymers of L-glutamic acid and gamma-ethyl-L-glutamate (Sidman et al., Biopolymers 22:547-556 (1983)), poly (2- hydroxyethyl methacrylate) (Langer et al., J. Biomed. Mater. Res. 15:167-277 (1981), and Langer, Chem. Tech. 12:98-105 (1982)), ethylene vinyl acetate (Langer et al., Id.) or poly-D- (-)-3-hydroxybutyric acid (EP 133,988).

Sustained-release Therapeutics also include liposomally entrapped Therapeutics of the invention (*see* generally, Langer, *Science* 249:1527-1533 (1990); Treat et al., in *Liposomes in the Therapy of Infectious Disease and Cancer*, Lopez-Berestein and Fidler (eds.), Liss, New York, pp. 317 -327 and 353-365 (1989)). Liposomes containing the Therapeutic are prepared by methods known per se: DE 3,218,121; Epstein et al., Proc. Natl. Acad. Sci. (USA) 82:3688-3692 (1985); Hwang et al., Proc. Natl. Acad. Sci.(USA) 77:4030-4034 (1980); EP 52,322; EP 36,676; EP 88,046; EP 143,949; EP 142,641; Japanese Pat. Appl. 83-118008; U.S. Pat. Nos. 4,485,045 and 4,544,545; and EP 102,324. Ordinarily, the liposomes are of the small (about 200-800 Angstroms) unilamellar type in which the lipid content is greater than about 30 mol. percent cholesterol, the selected proportion being adjusted for the optimal Therapeutic.

In yet an additional embodiment, the Therapeutics of the invention are delivered by way of a pump (*see* Langer, *supra*; Sefton, CRC Crit. Ref. Biomed. Eng. 14:201 (1987);

Buchwald et al., Surgery 88:507 (1980); Saudek et al., N. Engl. J. Med. 321:574 (1989)).

Other controlled release systems are discussed in the review by Langer (*Science* 249:1527-1533 (1990)).

For parenteral administration, in one embodiment, the Therapeutic is formulated generally by mixing it at the desired degree of purity, in a unit dosage injectable form (solution, suspension, or emulsion), with a pharmaceutically acceptable carrier, i.e., one that is non-toxic to recipients at the dosages and concentrations employed and is compatible with other ingredients of the formulation. For example, the formulation preferably does not include oxidizing agents and other compounds that are known to be deleterious to the Therapeutic.

Generally, the formulations are prepared by contacting the Therapeutic uniformly and intimately with liquid carriers or finely divided solid carriers or both. Then, if necessary, the product is shaped into the desired formulation. Preferably the carrier is a parenteral carrier, more preferably a solution that is isotonic with the blood of the recipient. Examples of such carrier vehicles include water, saline, Ringer's solution, and dextrose solution. Non-aqueous vehicles such as fixed oils and ethyl oleate are also useful herein, as well as liposomes.

The carrier suitably contains minor amounts of additives such as substances that enhance isotonicity and chemical stability. Such materials are non-toxic to recipients at the dosages and concentrations employed, and include buffers such as phosphate, citrate, succinate, acetic acid, and other organic acids or their salts; antioxidants such as ascorbic acid; low molecular weight (less than about ten residues) polypeptides, e.g., polyarginine or tripeptides; proteins, such as serum albumin, gelatin, or immunoglobulins; hydrophilic polymers such as polyvinylpyrrolidone; amino acids, such as glycine, glutamic acid, aspartic acid, or arginine; monosaccharides, disaccharides, and other carbohydrates including cellulose or its derivatives, glucose, manose, or dextrins; chelating agents such as EDTA; sugar alcohols such as mannitol or sorbitol; counterions such as sodium; and/or nonionic surfactants such as polysorbates, poloxamers, or PEG.

The Therapeutic is typically formulated in such vehicles at a concentration of about 0.1 mg/ml to 100 mg/ml, preferably 1-10 mg/ml, at a pH of about 3 to 8. It will be understood that the use of certain of the foregoing excipients, carriers, or stabilizers will result in the formation of polypeptide salts.

Any pharmaceutical used for therapeutic administration can be sterile. Sterility is

readily accomplished by filtration through sterile filtration membranes (e.g., 0.2 micron membranes). Therapeutics generally are placed into a container having a sterile access port, for example, an intravenous solution bag or vial having a stopper pierceable by a hypodermic injection needle.

Therapeutics ordinarily will be stored in unit or multi-dose containers, for example, sealed ampoules or vials, as an aqueous solution or as a lyophilized formulation for reconstitution. As an example of a lyophilized formulation, 10-ml vials are filled with 5 ml of sterile-filtered 1% (w/v) aqueous Therapeutic solution, and the resulting mixture is lyophilized. The infusion solution is prepared by reconstituting the lyophilized Therapeutic using bacteriostatic Water-for-Injection.

The invention also provides a pharmaceutical pack or kit comprising one or more containers filled with one or more of the ingredients of the Therapeutics of the invention. Associated with such container(s) can be a notice in the form prescribed by a governmental agency regulating the manufacture, use or sale of pharmaceuticals or biological products, which notice reflects approval by the agency of manufacture, use or sale for human administration. In addition, the Therapeutics may be employed in conjunction with other therapeutic compounds.

The Therapeutics of the invention may be administered alone or in combination with adjuvants. Adjuvants that may be administered with the Therapeutics of the invention include, but are not limited to, alum, alum plus deoxycholate (ImmunoAg), MTP-PE (Biocine Corp.), QS21 (Genentech, Inc.), BCG, and MPL. In a specific embodiment, Therapeutics of the invention are administered in combination with alum. In another specific embodiment, Therapeutics of the invention are administered in combination with QS-21. Further adjuvants that may be administered with the Therapeutics of the invention include, but are not limited to, Monophosphoryl lipid immunomodulator, AdjuVax 100a, QS-21, QS-18, CRL1005, Aluminum salts, MF-59, and Virosomal adjuvant technology. Vaccines that may be administered with the Therapeutics of the invention include, but are not limited to, vaccines directed toward protection against MMR (measles, mumps, rubella), polio, varicella, tetanus/diptheria, hepatitis A, hepatitis B, haemophilus influenzae B, whooping cough, pneumonia, influenza, Lyme's Disease, rotavirus, cholera, yellow fever, Japanese encephalitis, poliomyelitis, rabies, typhoid fever, and pertussis. Combinations may be administered either concomitantly, e.g., as an admixture, separately but simultaneously or

concurrently; or sequentially. This includes presentations in which the combined agents are administered together as a therapeutic mixture, and also procedures in which the combined agents are administered separately but simultaneously, e.g., as through separate intravenous lines into the same individual. Administration "in combination" further includes the separate administration of one of the compounds or agents given first, followed by the second.

The Therapeutics of the invention may be administered alone or in combination with other therapeutic agents. Therapeutic agents that may be administered in combination with the Therapeutics of the invention, include but not limited to, other members of the TNF family, chemotherapeutic agents, antibiotics, steroidal and non-steroidal anti-inflammatories, conventional immunotherapeutic agents, cytokines and/or growth factors. Combinations may be administered either concomitantly, e.g., as an admixture, separately but simultaneously or concurrently; or sequentially. This includes presentations in which the combined agents are administered together as a therapeutic mixture, and also procedures in which the combined agents are administered separately but simultaneously, e.g., as through separate intravenous lines into the same individual. Administration "in combination" further includes the separate administration of one of the compounds or agents given first, followed by the second.

In one embodiment, the Therapeutics of the invention are administered in combination with members of the TNF family. TNF, TNF-related or TNF-like molecules that may be administered with the Therapeutics of the invention include, but are not limited to, soluble forms of TNF-alpha, lymphotoxin-alpha (LT-alpha, also known as TNF-beta), LT-beta (found in complex heterotrimer LT-alpha2-beta), OPGL, FasL, CD27L, CD30L, CD40L, 4-1BBL, DcR3, OX40L, TNF-gamma (International Publication No. WO 96/14328), AIM-I (International Publication No. WO 97/33899), endokine-alpha (International Publication No. WO 98/07880), TR6 (International Publication No. WO 98/30694), OPG, and neutrokine-alpha (International Publication No. WO 98/18921, OX40, and nerve growth factor (NGF), and soluble forms of Fas, CD30, CD27, CD40 and 4-IBB, TR2 (International Publication No. WO 96/34095), DR3 (International Publication No. WO 97/33904), DR4 (International Publication No. WO 98/32856), TR5 (International Publication No. WO 98/30693), TR6 (International Publication No. WO 98/30694), TR7 (International Publication No. WO 98/41629), TRANK, TR9 (International Publication No. WO 98/56892),TR10 (International Publication No. WO 98/54202), 312C2 (International Publication No. WO 98/06842), and TR12, and soluble forms CD154, CD70, and CD153.

In certain embodiments, Therapeutics of the invention are administered in combination with antiretroviral agents, nucleoside reverse transcriptase inhibitors, non-nucleoside reverse transcriptase inhibitors, and/or protease inhibitors. Nucleoside reverse transcriptase inhibitors that may be administered in combination with the Therapeutics of the invention, include, but are not limited to, RETROVIR™ (zidovudine/AZT), VIDEX™ (didanosine/ddI), HIVID™ (zalcitabine/ddC), ZERIT™ (stavudine/d4T), EPIVIR™ (lamivudine/3TC), and COMBIVIR™ (zidovudine/lamivudine). Non-nucleoside reverse transcriptase inhibitors that may be administered in combination with the Therapeutics of the invention, include, but are not limited to, VIRAMUNE™ (nevirapine), RESCRIPTOR™ (delavirdine), and SUSTIVA™ (efavirenz). Protease inhibitors that may be administered in combination with the Therapeutics of the invention, include, but are not limited to, CRIXIVAN™ (indinavir), NORVIR™ (ritonavir), INVIRASE™ (saquinavir), and VIRACEPT™ (nelfinavir). In a specific embodiment, antiretroviral agents, nucleoside reverse transcriptase inhibitors, non-nucleoside reverse transcriptase inhibitors, and/or protease inhibitors may be used in any combination with Therapeutics of the invention to treat AIDS and/or to prevent or treat HIV infection.

In other embodiments, Therapeutics of the invention may be administered in combination with anti-opportunistic infection agents. Anti-opportunistic agents that may be administered in combination with the Therapeutics of the invention, include, but are not limited to, TRIMETHOPRIM-SULFAMETHOXAZOLE™, DAPSONE™, PENTAMIDINE™, ATOVAQUONE™, ISONIAZID™, RIFAMPIN™, PYRAZINAMIDE™, ETHAMBUTOL™, RIFABUTIN™, CLARITHROMYCIN™, AZITHROMYCIN™, GANCICLOVIR™, FOSCARNET™, CIDOFOVIR™, FLUCONAZOLE™, ITRACONAZOLE™, KETOCONAZOLE™, ACYCLOVIR™, FAMCICOLVIR™, PYRIMETHAMINE™, LEUCOVORIN™, NEUPOGEN™ (filgrastim/G-CSF), and LEUKINE™ (sargramostim/GM-CSF). In a specific embodiment, Therapeutics of the invention are used in any combination with TRIMETHOPRIM-SULFAMETHOXAZOLE™, DAPSONE™, PENTAMIDINE™, and/or ATOVAQUONE™ to prophylactically treat or prevent an opportunistic *Pneumocystis carinii* pneumonia infection. In another specific embodiment, Therapeutics of the invention are used in any combination with ISONIAZID™, RIFAMPIN™, PYRAZINAMIDE™, and/or ETHAMBUTOL™ to prophylactically treat or

prevent an opportunistic *Mycobacterium avium* complex infection. In another specific embodiment, Therapeutics of the invention are used in any combination with RIFABUTIN™, CLARITHROMYCIN™, and/or AZITHROMYCIN™ to prophylactically treat or prevent an opportunistic *Mycobacterium tuberculosis* infection. In another specific embodiment, Therapeutics of the invention are used in any combination with GANCICLOVIR™, FOSCARNET™, and/or CIDOFOVIR™ to prophylactically treat or prevent an opportunistic cytomegalovirus infection. In another specific embodiment, Therapeutics of the invention are used in any combination with FLUCONAZOLE™, ITRACONAZOLE™, and/or KETOCONAZOLE™ to prophylactically treat or prevent an opportunistic fungal infection. In another specific embodiment, Therapeutics of the invention are used in any combination with ACYCLOVIR™ and/or FAMCICOLVIR™ to prophylactically treat or prevent an opportunistic herpes simplex virus type I and/or type II infection. In another specific embodiment, Therapeutics of the invention are used in any combination with PYRIMETHAMINE™ and/or LEUCOVORIN™ to prophylactically treat or prevent an opportunistic *Toxoplasma gondii* infection. In another specific embodiment, Therapeutics of the invention are used in any combination with LEUCOVORIN™ and/or NEUPOGEN™ to prophylactically treat or prevent an opportunistic bacterial infection.

In a further embodiment, the Therapeutics of the invention are administered in combination with an antiviral agent. Antiviral agents that may be administered with the Therapeutics of the invention include, but are not limited to, acyclovir, ribavirin, amantadine, and remantidine.

In a further embodiment, the Therapeutics of the invention are administered in combination with an antibiotic agent. Antibiotic agents that may be administered with the Therapeutics of the invention include, but are not limited to, amoxicillin, beta-lactamases, aminoglycosides, beta-lactam (glycopeptide), beta-lactamases, Clindamycin, chloramphenicol, cephalosporins, ciprofloxacin, ciprofloxacin, erythromycin, fluoroquinolones, macrolides, metronidazole, penicillins, quinolones, rifampin, streptomycin, sulfonamide, tetracyclines, trimethoprim, trimethoprim-sulfamthoxazole, and vancomycin.

Conventional nonspecific immunosuppressive agents, that may be administered in combination with the Therapeutics of the invention include, but are not limited to, steroids, cyclosporine, cyclosporine analogs, cyclophosphamide methylprednisone, prednisone,

azathioprine, FK-506, 15-deoxyspergualin, and other immunosuppressive agents that act by suppressing the function of responding T cells.

In specific embodiments, Therapeutics of the invention are administered in combination with immunosuppressants. Immunosuppressants preparations that may be administered with the Therapeutics of the invention include, but are not limited to, ORTHOCLONE™ (OKT3), SANDIMMUNE™/NEORAL™/SANGDYA™ (cyclosporin), PROGRAF™ (tacrolimus), CELLCEPT™ (mycophenolate), Azathioprine, glucorticosteroids, and RAPAMUNE™ (sirolimus). In a specific embodiment, immunosuppressants may be used to prevent rejection of organ or bone marrow transplantation.

In an additional embodiment, Therapeutics of the invention are administered alone or in combination with one or more intravenous immune globulin preparations. Intravenous immune globulin preparations that may be administered with the Therapeutics of the invention include, but not limited to, GAMMAR™, IVEEGAM™, SANDOGLOBULIN™, GAMMAGARD S/D™, and GAMIMUNE™. In a specific embodiment, Therapeutics of the invention are administered in combination with intravenous immune globulin preparations in transplantation therapy (e.g., bone marrow transplant).

In an additional embodiment, the Therapeutics of the invention are administered alone or in combination with an anti-inflammatory agent. Anti-inflammatory agents that may be administered with the Therapeutics of the invention include, but are not limited to, glucocorticoids and the nonsteroidal anti-inflammatories, aminoarylcarboxylic acid derivatives, arylacetic acid derivatives, arylbutyric acid derivatives, arylcarboxylic acids, arylpropionic acid derivatives, pyrazoles, pyrazolones, salicylic acid derivatives, thiazinecarboxamides, e-acetamidocaproic acid, S-adenosylmethionine, 3-amino-4-hydroxybutyric acid, amixetrine, bendazac, benzydamine, bucolome, difenpiramide, ditazol, emorfazone, guaiazulene, nabumetone, nimesulide, orgotein, oxaceprol, paranyline, perisoxal, pifoxime, proquazone, proxazole, and tenidap.

In another embodiment, compostions of the invention are administered in combination with a chemotherapeutic agent. Chemotherapeutic agents that may be administered with the Therapeutics of the invention include, but are not limited to, antibiotic derivatives (e.g., doxorubicin, bleomycin, daunorubicin, and dactinomycin); antiestrogens (e.g., tamoxifen); antimetabolites (e.g., fluorouracil, 5-FU, methotrexate, floxuridine, interferon alpha-2b, glutamic acid, plicamycin, mercaptopurine, and 6-thioguanine);

cytotoxic agents (e.g., carmustine, BCNU, lomustine, CCNU, cytosine arabinoside, cyclophosphamide, estramustine, hydroxyurea, procarbazine, mitomycin, busulfan, cis-platin, and vincristine sulfate); hormones (e.g., medroxyprogesterone, estramustine phosphate sodium, ethinyl estradiol, estradiol, megestrol acetate, methyltestosterone, diethylstilbestrol diphosphate, chlorotrianisene, and testolactone); nitrogen mustard derivatives (e.g., mephalen, chorambucil, mechlorethamine (nitrogen mustard) and thiotepa); steroids and combinations (e.g., bethamethasone sodium phosphate); and others (e.g., dicarbazine, asparaginase, mitotane, vincristine sulfate, vinblastine sulfate, and etoposide).

In a specific embodiment, Therapeutics of the invention are administered in combination with CHOP (cyclophosphamide, doxorubicin, vincristine, and prednisone) or any combination of the components of CHOP. In another embodiment, Therapeutics of the invention are administered in combination with Rituximab. In a further embodiment, Therapeutics of the invention are administered with Rituxmab and CHOP, or Rituxmab and any combination of the components of CHOP.

In an additional embodiment, the Therapeutics of the invention are administered in combination with cytokines. Cytokines that may be administered with the Therapeutics of the invention include, but are not limited to, IL2, IL3, IL4, IL5, IL6, IL7, IL10, IL12, IL13, IL15, anti-CD40, CD40L, IFN-gamma and TNF-alpha. In another embodiment, Therapeutics of the invention may be administered with any interleukin, including, but not limited to, IL-1alpha, IL-1beta, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-13, IL-14, IL-15, IL-16, IL-17, IL-18, IL-19, IL-20, and IL-21.

In an additional embodiment, the Therapeutics of the invention are administered in combination with angiogenic proteins. Angiogenic proteins that may be administered with the Therapeutics of the invention include, but are not limited to, Glioma Derived Growth Factor (GDGF), as disclosed in European Patent Number EP-399816; Platelet Derived Growth Factor-A (PDGF-A), as disclosed in European Patent Number EP-682110; Platelet Derived Growth Factor-B (PDGF-B), as disclosed in European Patent Number EP-282317; Placental Growth Factor (PlGF), as disclosed in International Publication Number WO 92/06194; Placental Growth Factor-2 (PlGF-2), as disclosed in Hauser et al., Gorwth Factors, 4:259-268 (1993); Vascular Endothelial Growth Factor (VEGF), as disclosed in International Publication Number WO 90/13649; Vascular Endothelial Growth Factor-A (VEGF-A), as disclosed in European Patent Number EP-506477; Vascular Endothelial Growth Factor-2

(VEGF-2), as disclosed in International Publication Number WO 96/39515; Vascular Endothelial Growth Factor B (VEGF-3); Vascular Endothelial Growth Factor B-186 (VEGF-B186), as disclosed in International Publication Number WO 96/26736; Vascular Endothelial Growth Factor-D (VEGF-D), as disclosed in International Publication Number WO 98/02543; Vascular Endothelial Growth Factor-D (VEGF-D), as disclosed in International Publication Number WO 98/07832; and Vascular Endothelial Growth Factor-E (VEGF-E), as disclosed in German Patent Number DE19639601. The above mentioned references are incorporated herein by reference herein.

In an additional embodiment, the Therapeutics of the invention are administered in combination with hematopoietic growth factors. Hematopoietic growth factors that may be administered with the Therapeutics of the invention include, but are not limited to, LEUKINE™ (SARGRAMOSTIM™) and NEUPOGEN™ (FILGRASTIM™).

In an additional embodiment, the Therapeutics of the invention are administered in combination with Fibroblast Growth Factors. Fibroblast Growth Factors that may be administered with the Therapeutics of the invention include, but are not limited to, FGF-1, FGF-2, FGF-3, FGF-4, FGF-5, FGF-6, FGF-7, FGF-8, FGF-9, FGF-10, FGF-11, FGF-12, FGF-13, FGF-14, and FGF-15.

In additional embodiments, the Therapeutics of the invention are administered in combination with other therapeutic or prophylactic regimens, such as, for example, radiation therapy.

Example 14: Method of Treating Decreased Levels of the Polypeptide

The present invention relates to a method for treating an individual in need of an increased level of a polypeptide of the invention in the body comprising administering to such an individual a composition comprising a therapeutically effective amount of an agonist of the invention (including polypeptides of the invention). Moreover, it will be appreciated that conditions caused by a decrease in the standard or normal expression level of a polypeptide of the present invention in an individual can be treated by administering the agonist or antagonist of the present invention. Thus, the invention also provides a method of treatment of an individual in need of an increased level of the polypeptide comprising administering to such an individual a Therapeutic comprising an amount of the agonist or

antagonist to increase the activity level of the polypeptide in such an individual.

For example, a patient with decreased levels of a polypeptide receives a daily dose 0.1-100 ug/kg of the agonist or antagonist for six consecutive days. The exact details of the dosing scheme, based on administration and formulation, are provided in Example 13.

Example 15: Method of Treating Increased Levels of the Polypeptide

The present invention also relates to a method of treating an individual in need of a decreased level of a polypeptide of the invention in the body comprising administering to such an individual a composition comprising a therapeutically effective amount of an antagonist of the invention (including polypeptides and antibodies of the invention).

In one example, antisense technology is used to inhibit production of a polypeptide of the present invention. This technology is one example of a method of decreasing levels of a polypeptide, due to a variety of etiologies, such as cancer.

For example, a patient diagnosed with abnormally increased levels of a polypeptide is administered intravenously antisense polynucleotides at 0.5, 1.0, 1.5, 2.0 and 3.0 mg/kg day for 21 days. This treatment is repeated after a 7-day rest period if the treatment was well tolerated. The formulation of the antisense polynucleotide is provided in Example 13.

Example 16: Method of Treatment Using Gene Therapy-Ex Vivo

One method of gene therapy transplants fibroblasts, which are capable of expressing a polypeptide, onto a patient. Generally, fibroblasts are obtained from a subject by skin biopsy. The resulting tissue is placed in tissue-culture medium and separated into small pieces. Small chunks of the tissue are placed on a wet surface of a tissue culture flask, approximately ten pieces are placed in each flask. The flask is turned upside down, closed tight and left at room temperature over night. After 24 hours at room temperature, the flask is inverted and the chunks of tissue remain fixed to the bottom of the flask and fresh media (e.g., Ham's F12 media, with 10% FBS, penicillin and streptomycin) is added. The flasks are then incubated at 37 degree C for approximately one week.

At this time, fresh media is added and subsequently changed every several days. After an additional two weeks in culture, a monolayer of fibroblasts emerge. The monolayer

is trypsinized and scaled into larger flasks.

pMV-7 (Kirschmeier, P.T. et al., DNA, 7:219-25 (1988)), flanked by the long terminal repeats of the Moloney murine sarcoma virus, is digested with EcoRI and HindIII and subsequently treated with calf intestinal phosphatase. The linear vector is fractionated on agarose gel and purified, using glass beads.

The cDNA encoding a polypeptide of the present invention can be amplified using PCR primers which correspond to the 5' and 3' end sequences respectively as set forth in Example 1 using primers and having appropriate restriction sites and initiation/stop codons, if necessary. Preferably, the 5' primer contains an EcoRI site and the 3' primer includes a HindIII site. Equal quantities of the Moloney murine sarcoma virus linear backbone and the amplified EcoRI and HindIII fragment are added together, in the presence of T4 DNA ligase. The resulting mixture is maintained under conditions appropriate for ligation of the two fragments. The ligation mixture is then used to transform bacteria HB101, which are then plated onto agar containing kanamycin for the purpose of confirming that the vector has the gene of interest properly inserted.

The amphotropic pA317 or GP+am12 packaging cells are grown in tissue culture to confluent density in Dulbecco's Modified Eagles Medium (DMEM) with 10% calf serum (CS), penicillin and streptomycin. The MSV vector containing the gene is then added to the media and the packaging cells transduced with the vector. The packaging cells now produce infectious viral particles containing the gene (the packaging cells are now referred to as producer cells).

Fresh media is added to the transduced producer cells, and subsequently, the media is harvested from a 10 cm plate of confluent producer cells. The spent media, containing the infectious viral particles, is filtered through a millipore filter to remove detached producer cells and this media is then used to infect fibroblast cells. Media is removed from a sub-confluent plate of fibroblasts and quickly replaced with the media from the producer cells. This media is removed and replaced with fresh media. If the titer of virus is high, then virtually all fibroblasts will be infected and no selection is required. If the titer is very low, then it is necessary to use a retroviral vector that has a selectable marker, such as neo or his. Once the fibroblasts have been efficiently infected, the fibroblasts are analyzed to determine whether protein is produced.

The engineered fibroblasts are then transplanted onto the host, either alone or after

having been grown to confluence on cytodex 3 microcarrier beads.

Example 17: Gene Therapy Using Endogenous Genes Corresponding To Polynucleotides of the Invention

Another method of gene therapy according to the present invention involves operably associating the endogenous polynucleotide sequence of the invention with a promoter via homologous recombination as described, for example, in U.S. Patent NO: 5,641,670, issued June 24, 1997; International Publication NO: WO 96/29411, published September 26, 1996; International Publication NO: WO 94/12650, published August 4, 1994; Koller et al., *Proc. Natl. Acad. Sci. USA,* 86:8932-8935 (1989); and Zijlstra et al., *Nature,* 342:435-438 (1989). This method involves the activation of a gene which is present in the target cells, but which is not expressed in the cells, or is expressed at a lower level than desired.

Polynucleotide constructs are made which contain a promoter and targeting sequences, which are homologous to the 5' non-coding sequence of endogenous polynucleotide sequence, flanking the promoter. The targeting sequence will be sufficiently near the 5' end of the polynucleotide sequence so the promoter will be operably linked to the endogenous sequence upon homologous recombination. The promoter and the targeting sequences can be amplified using PCR. Preferably, the amplified promoter contains distinct restriction enzyme sites on the 5' and 3' ends. Preferably, the 3' end of the first targeting sequence contains the same restriction enzyme site as the 5' end of the amplified promoter and the 5' end of the second targeting sequence contains the same restriction site as the 3' end of the amplified promoter.

The amplified promoter and the amplified targeting sequences are digested with the appropriate restriction enzymes and subsequently treated with calf intestinal phosphatase. The digested promoter and digested targeting sequences are added together in the presence of T4 DNA ligase. The resulting mixture is maintained under conditions appropriate for ligation of the two fragments. The construct is size fractionated on an agarose gel then purified by phenol extraction and ethanol precipitation.

In this Example, the polynucleotide constructs are administered as naked polynucleotides via electroporation. However, the polynucleotide constructs may also be administered with transfection-facilitating agents, such as liposomes, viral sequences, viral

particles, precipitating agents, etc. Such methods of delivery are known in the art.

Once the cells are transfected, homologous recombination will take place which results in the promoter being operably linked to the endogenous polynucleotide sequence. This results in the expression of polynucleotide corresponding to the polynucleotide in the cell. Expression may be detected by immunological staining, or any other method known in the art.

Fibroblasts are obtained from a subject by skin biopsy. The resulting tissue is placed in DMEM + 10% fetal calf serum. Exponentially growing or early stationary phase fibroblasts are trypsinized and rinsed from the plastic surface with nutrient medium. An aliquot of the cell suspension is removed for counting, and the remaining cells are subjected to centrifugation. The supernatant is aspirated and the pellet is resuspended in 5 ml of electroporation buffer (20 mM HEPES pH 7.3, 137 mM NaCl, 5 mM KCl, 0.7 mM Na_2HPO_4, 6 mM dextrose). The cells are recentrifuged, the supernatant aspirated, and the cells resuspended in electroporation buffer containing 1 mg/ml acetylated bovine serum albumin. The final cell suspension contains approximately $3X10^6$ cells/ml. Electroporation should be performed immediately following resuspension.

Plasmid DNA is prepared according to standard techniques. For example, to construct a plasmid for targeting to the locus corresponding to the polynucleotide of the invention, plasmid pUC18 (MBI Fermentas, Amherst, NY) is digested with HindIII. The CMV promoter is amplified by PCR with an XbaI site on the 5' end and a BamHI site on the 3'end. Two non-coding sequences are amplified via PCR: one non-coding sequence (fragment 1) is amplified with a HindIII site at the 5' end and an Xba site at the 3'end; the other non-coding sequence (fragment 2) is amplified with a BamHI site at the 5'end and a HindIII site at the 3'end. The CMV promoter and the fragments (1 and 2) are digested with the appropriate enzymes (CMV promoter - XbaI and BamHI; fragment 1 - XbaI; fragment 2 - BamHI) and ligated together. The resulting ligation product is digested with HindIII, and ligated with the HindIII-digested pUC18 plasmid.

Plasmid DNA is added to a sterile cuvette with a 0.4 cm electrode gap (Bio-Rad). The final DNA concentration is generally at least 120 µg/ml. 0.5 ml of the cell suspension (containing approximately $1.5.X10^6$ cells) is then added to the cuvette, and the cell suspension and DNA solutions are gently mixed. Electroporation is performed with a Gene-Pulser apparatus (Bio-Rad). Capacitance and voltage are set at 960 µF and 250-300 V,

respectively. As voltage increases, cell survival decreases, but the percentage of surviving cells that stably incorporate the introduced DNA into their genome increases dramatically. Given these parameters, a pulse time of approximately 14-20 mSec should be observed.

Electroporated cells are maintained at room temperature for approximately 5 min, and the contents of the cuvette are then gently removed with a sterile transfer pipette. The cells are added directly to 10 ml of prewarmed nutrient media (DMEM with 15% calf serum) in a 10 cm dish and incubated at 37 degree C. The following day, the media is aspirated and replaced with 10 ml of fresh media and incubated for a further 16-24 hours.

The engineered fibroblasts are then injected into the host, either alone or after having been grown to confluence on cytodex 3 microcarrier beads. The fibroblasts now produce the protein product. The fibroblasts can then be introduced into a patient as described above.

Example 18: Method of Treatment Using Gene Therapy - In Vivo

Another aspect of the present invention is using *in vivo* gene therapy methods to treat disorders, diseases and conditions. The gene therapy method relates to the introduction of naked nucleic acid (DNA, RNA, and antisense DNA or RNA) sequences into an animal to increase or decrease the expression of the polypeptide. The polynucleotide of the present invention may be operatively linked to a promoter or any other genetic elements necessary for the expression of the polypeptide by the target tissue. Such gene therapy and delivery techniques and methods are known in the art, see, for example, WO90/11092, WO98/11779; U.S. Patent NO. 5693622, 5705151, 5580859; Tabata et al., Cardiovasc. Res. 35(3):470-479 (1997); Chao et al., Pharmacol. Res. 35(6):517-522 (1997); Wolff, Neuromuscul. Disord. 7(5):314-318 (1997); Schwartz et al., Gene Ther. 3(5):405-411 (1996); Tsurumi et al., Circulation 94(12):3281-3290 (1996) (incorporated herein by reference).

The polynucleotide constructs may be delivered by any method that delivers injectable materials to the cells of an animal, such as, injection into the interstitial space of tissues (heart, muscle, skin, lung, liver, intestine and the like). The polynucleotide constructs can be delivered in a pharmaceutically acceptable liquid or aqueous carrier.

The term "naked" polynucleotide, DNA or RNA, refers to sequences that are free from any delivery vehicle that acts to assist, promote, or facilitate entry into the cell,

including viral sequences, viral particles, liposome formulations, lipofectin or precipitating agents and the like. However, the polynucleotides of the present invention may also be delivered in liposome formulations (such as those taught in Felgner P.L. et al. (1995) Ann. NY Acad. Sci. 772:126-139 and Abdallah B. et al. (1995) Biol. Cell 85(1):1-7) which can be prepared by methods well known to those skilled in the art.

The polynucleotide vector constructs used in the gene therapy method are preferably constructs that will not integrate into the host genome nor will they contain sequences that allow for replication. Any strong promoter known to those skilled in the art can be used for driving the expression of DNA. Unlike other gene therapies techniques, one major advantage of introducing naked nucleic acid sequences into target cells is the transitory nature of the polynucleotide synthesis in the cells. Studies have shown that non-replicating DNA sequences can be introduced into cells to provide production of the desired polypeptide for periods of up to six months.

The polynucleotide construct can be delivered to the interstitial space of tissues within the an animal, including of muscle, skin, brain, lung, liver, spleen, bone marrow, thymus, heart, lymph, blood, bone, cartilage, pancreas, kidney, gall bladder, stomach, intestine, testis, ovary, uterus, rectum, nervous system, eye, gland, and connective tissue. Interstitial space of the tissues comprises the intercellular fluid, mucopolysaccharide matrix among the reticular fibers of organ tissues, elastic fibers in the walls of vessels or chambers, collagen fibers of fibrous tissues, or that same matrix within connective tissue ensheathing muscle cells or in the lacunae of bone. It is similarly the space occupied by the plasma of the circulation and the lymph fluid of the lymphatic channels. Delivery to the interstitial space of muscle tissue is preferred for the reasons discussed below. They may be conveniently delivered by injection into the tissues comprising these cells. They are preferably delivered to and expressed in persistent, non-dividing cells which are differentiated, although delivery and expression may be achieved in non-differentiated or less completely differentiated cells, such as, for example, stem cells of blood or skin fibroblasts. *In vivo* muscle cells are particularly competent in their ability to take up and express polynucleotides.

For the naked polynucleotide injection, an effective dosage amount of DNA or RNA will be in the range of from about 0.05 g/kg body weight to about 50 mg/kg body weight. Preferably the dosage will be from about 0.005 mg/kg to about 20 mg/kg and more preferably from about 0.05 mg/kg to about 5 mg/kg. Of course, as the artisan of ordinary skill will

appreciate, this dosage will vary according to the tissue site of injection. The appropriate and effective dosage of nucleic acid sequence can readily be determined by those of ordinary skill in the art and may depend on the condition being treated and the route of administration. The preferred route of administration is by the parenteral route of injection into the interstitial space of tissues. However, other parenteral routes may also be used, such as, inhalation of an aerosol formulation particularly for delivery to lungs or bronchial tissues, throat or mucous membranes of the nose. In addition, naked polynucleotide constructs can be delivered to arteries during angioplasty by the catheter used in the procedure.

The dose response effects of injected polynucleotide in muscle *in vivo* is determined as follows. Suitable template DNA for production of mRNA coding for polypeptide of the present invention is prepared in accordance with a standard recombinant DNA methodology. The template DNA, which may be either circular or linear, is either used as naked DNA or complexed with liposomes. The quadriceps muscles of mice are then injected with various amounts of the template DNA.

Five to six week old female and male Balb/C mice are anesthetized by intraperitoneal injection with 0.3 ml of 2.5% Avertin. A 1.5 cm incision is made on the anterior thigh, and the quadriceps muscle is directly visualized. The template DNA is injected in 0.1 ml of carrier in a 1 cc syringe through a 27 gauge needle over one minute, approximately 0.5 cm from the distal insertion site of the muscle into the knee and about 0.2 cm deep. A suture is placed over the injection site for future localization, and the skin is closed with stainless steel clips.

After an appropriate incubation time (e.g., 7 days) muscle extracts are prepared by excising the entire quadriceps. Every fifth 15 um cross-section of the individual quadriceps muscles is histochemically stained for protein expression. A time course for protein expression may be done in a similar fashion except that quadriceps from different mice are harvested at different times. Persistence of DNA in muscle following injection may be determined by Southern blot analysis after preparing total cellular DNA and HIRT supernatants from injected and control mice. The results of the above experimentation in mice can be use to extrapolate proper dosages and other treatment parameters in humans and other animals using naked DNA.

Example 19: Transgenic Animals

The polypeptides of the invention can also be expressed in transgenic animals. Animals of any species, including, but not limited to, mice, rats, rabbits, hamsters, guinea pigs, pigs, micro-pigs, goats, sheep, cows and non-human primates, *e.g.*, baboons, monkeys, and chimpanzees may be used to generate transgenic animals. In a specific embodiment, techniques described herein or otherwise known in the art, are used to express polypeptides of the invention in humans, as part of a gene therapy protocol.

Any technique known in the art may be used to introduce the transgene (i.e., polynucleotides of the invention) into animals to produce the founder lines of transgenic animals. Such techniques include, but are not limited to, pronuclear microinjection (Paterson et al., Appl. Microbiol. Biotechnol. 40:691-698 (1994); Carver et al., Biotechnology (NY) 11:1263-1270 (1993); Wright et al., Biotechnology (NY) 9:830-834 (1991); and Hoppe et al., U.S. Pat. No. 4,873,191 (1989)); retrovirus mediated gene transfer into germ lines (Van der Putten et al., Proc. Natl. Acad. Sci., USA 82:6148-6152 (1985)), blastocysts or embryos; gene targeting in embryonic stem cells (Thompson et al., Cell 56:313-321 (1989)); electroporation of cells or embryos (Lo, 1983, Mol Cell. Biol. 3:1803-1814 (1983)); introduction of the polynucleotides of the invention using a gene gun (see, e.g., Ulmer et al., Science 259:1745 (1993); introducing nucleic acid constructs into embryonic pleuripotent stem cells and transferring the stem cells back into the blastocyst; and sperm-mediated gene transfer (Lavitrano et al., Cell 57:717-723 (1989); etc. For a review of such techniques, see Gordon, "Transgenic Animals," Intl. Rev. Cytol. 115:171-229 (1989), which is incorporated by reference herein in its entirety.

Any technique known in the art may be used to produce transgenic clones containing polynucleotides of the invention, for example, nuclear transfer into enucleated oocytes of nuclei from cultured embryonic, fetal, or adult cells induced to quiescence (Campell et al., Nature 380:64-66 (1996); Wilmut et al., Nature 385:810-813 (1997)).

The present invention provides for transgenic animals that carry the transgene in all their cells, as well as animals which carry the transgene in some, but not all their cells, *i.e.*, mosaic animals or chimeric. The transgene may be integrated as a single transgene or as multiple copies such as in concatamers, *e.g.*, head-to-head tandems or head-to-tail tandems. The transgene may also be selectively introduced into and activated in a particular cell type by following, for example, the teaching of Lasko et al. (Lasko et al., Proc. Natl. Acad. Sci.

USA 89:6232-6236 (1992)). The regulatory sequences required for such a cell-type specific activation will depend upon the particular cell type of interest, and will be apparent to those of skill in the art. When it is desired that the polynucleotide transgene be integrated into the chromosomal site of the endogenous gene, gene targeting is preferred. Briefly, when such a technique is to be utilized, vectors containing some nucleotide sequences homologous to the endogenous gene are designed for the purpose of integrating, via homologous recombination with chromosomal sequences, into and disrupting the function of the nucleotide sequence of the endogenous gene. The transgene may also be selectively introduced into a particular cell type, thus inactivating the endogenous gene in only that cell type, by following, for example, the teaching of Gu et al. (Gu et al., Science 265:103-106 (1994)). The regulatory sequences required for such a cell-type specific inactivation will depend upon the particular cell type of interest, and will be apparent to those of skill in the art.

Once transgenic animals have been generated, the expression of the recombinant gene may be assayed utilizing standard techniques. Initial screening may be accomplished by Southern blot analysis or PCR techniques to analyze animal tissues to verify that integration of the transgene has taken place. The level of mRNA expression of the transgene in the tissues of the transgenic animals may also be assessed using techniques which include, but are not limited to, Northern blot analysis of tissue samples obtained from the animal, *in situ* hybridization analysis, and reverse transcriptase-PCR (rt-PCR). Samples of transgenic gene-expressing tissue may also be evaluated immunocytochemically or immunohistochemically using antibodies specific for the transgene product.

Once the founder animals are produced, they may be bred, inbred, outbred, or crossbred to produce colonies of the particular animal. Examples of such breeding strategies include, but are not limited to: outbreeding of founder animals with more than one integration site in order to establish separate lines; inbreeding of separate lines in order to produce compound transgenics that express the transgene at higher levels because of the effects of additive expression of each transgene; crossing of heterozygous transgenic animals to produce animals homozygous for a given integration site in order to both augment expression and eliminate the need for screening of animals by DNA analysis; crossing of separate homozygous lines to produce compound heterozygous or homozygous lines; and breeding to place the transgene on a distinct background that is appropriate for an experimental model of interest.

Transgenic animals of the invention have uses which include, but are not limited to, animal model systems useful in elaborating the biological function of polypeptides of the present invention, studying conditions and/or disorders associated with aberrant expression, and in screening for compounds effective in ameliorating such conditions and/or disorders.

Example 20: Knock-Out Animals

Endogenous gene expression can also be reduced by inactivating or "knocking out" the gene and/or its promoter using targeted homologous recombination. (*E.g.*, see Smithies et al., Nature 317:230-234 (1985); Thomas & Capecchi, Cell 51:503-512 (1987); Thompson et al., Cell 5:313-321 (1989); each of which is incorporated by reference herein in its entirety). For example, a mutant, non-functional polynucleotide of the invention (or a completely unrelated DNA sequence) flanked by DNA homologous to the endogenous polynucleotide sequence (either the coding regions or regulatory regions of the gene) can be used, with or without a selectable marker and/or a negative selectable marker, to transfect cells that express polypeptides of the invention *in vivo*. In another embodiment, techniques known in the art are used to generate knockouts in cells that contain, but do not express the gene of interest. Insertion of the DNA construct, via targeted homologous recombination, results in inactivation of the targeted gene. Such approaches are particularly suited in research and agricultural fields where modifications to embryonic stem cells can be used to generate animal offspring with an inactive targeted gene (*e.g.*, see Thomas & Capecchi 1987 and Thompson 1989, *supra*). However this approach can be routinely adapted for use in humans provided the recombinant DNA constructs are directly administered or targeted to the required site *in vivo* using appropriate viral vectors that will be apparent to those of skill in the art.

In further embodiments of the invention, cells that are genetically engineered to express the polypeptides of the invention, or alternatively, that are genetically engineered not to express the polypeptides of the invention (e.g., knockouts) are administered to a patient *in vivo*. Such cells may be obtained from the patient (i.e., animal, including human) or an MHC compatible donor and can include, but are not limited to fibroblasts, bone marrow cells, blood cells (e.g., lymphocytes), adipocytes, muscle cells, endothelial cells etc. The cells are genetically engineered *in vitro* using recombinant DNA techniques to introduce the coding

sequence of polypeptides of the invention into the cells, or alternatively, to disrupt the coding sequence and/or endogenous regulatory sequence associated with the polypeptides of the invention, e.g., by transduction (using viral vectors, and preferably vectors that integrate the transgene into the cell genome) or transfection procedures, including, but not limited to, the use of plasmids, cosmids, YACs, naked DNA, electroporation, liposomes, etc. The coding sequence of the polypeptides of the invention can be placed under the control of a strong constitutive or inducible promoter or promoter/enhancer to achieve expression, and preferably secretion, of the polypeptides of the invention. The engineered cells which express and preferably secrete the polypeptides of the invention can be introduced into the patient systemically, e.g., in the circulation, or intraperitoneally.

Alternatively, the cells can be incorporated into a matrix and implanted in the body, e.g., genetically engineered fibroblasts can be implanted as part of a skin graft; genetically engineered endothelial cells can be implanted as part of a lymphatic or vascular graft. (See, for example, Anderson et al. U.S. Patent No. 5,399,349; and Mulligan & Wilson, U.S. Patent No. 5,460,959 each of which is incorporated by reference herein in its entirety).

When the cells to be administered are non-autologous or non-MHC compatible cells, they can be administered using well known techniques which prevent the development of a host immune response against the introduced cells. For example, the cells may be introduced in an encapsulated form which, while allowing for an exchange of components with the immediate extracellular environment, does not allow the introduced cells to be recognized by the host immune system.

Transgenic and "knock-out" animals of the invention have uses which include, but are not limited to, animal model systems useful in elaborating the biological function of polypeptides of the present invention, studying conditions and/or disorders associated with aberrant expression, and in screening for compounds effective in ameliorating such conditions and/or disorders.

Example 22: Assays Detecting Stimulation or Inhibition of B cell Proliferation and Differentiation

Generation of functional humoral immune responses requires both soluble and cognate signaling between B-lineage cells and their microenvironment. Signals may impart a

positive stimulus that allows a B-lineage cell to continue its programmed development, or a negative stimulus that instructs the cell to arrest its current developmental pathway. To date, numerous stimulatory and inhibitory signals have been found to influence B cell responsiveness including IL-2, IL-4, IL-5, IL-6, IL-7, IL10, IL-13, IL-14 and IL-15. Interestingly, these signals are by themselves weak effectors but can, in combination with various co-stimulatory proteins, induce activation, proliferation, differentiation, homing, tolerance and death among B cell populations.

One of the best studied classes of B-cell co-stimulatory proteins is the TNF-superfamily. Within this family CD40, CD27, and CD30 along with their respective ligands CD154, CD70, and CD153 have been found to regulate a variety of immune responses. Assays which allow for the detection and/or observation of the proliferation and differentiation of these B-cell populations and their precursors are valuable tools in determining the effects various proteins may have on these B-cell populations in terms of proliferation and differentiation. Listed below are two assays designed to allow for the detection of the differentiation, proliferation, or inhibition of B-cell populations and their precursors.

In Vitro Assay- Agonists or antagonists of the invention can be assessed for its ability to induce activation, proliferation, differentiation or inhibition and/or death in B-cell populations and their precursors. The activity of the agonists or antagonists of the invention on purified human tonsillar B cells, measured qualitatively over the dose range from 0.1 to 10,000 ng/mL, is assessed in a standard B-lymphocyte co-stimulation assay in which purified tonsillar B cells are cultured in the presence of either formalin-fixed Staphylococcus aureus Cowan I (SAC) or immobilized anti-human IgM antibody as the priming agent. Second signals such as IL-2 and IL-15 synergize with SAC and IgM crosslinking to elicit B cell proliferation as measured by tritiated-thymidine incorporation. Novel synergizing agents can be readily identified using this assay. The assay involves isolating human tonsillar B cells by magnetic bead (MACS) depletion of CD3-positive cells. The resulting cell population is greater than 95% B cells as assessed by expression of CD45R(B220).

Various dilutions of each sample are placed into individual wells of a 96-well plate to which are added 10^5 B-cells suspended in culture medium (RPMI 1640 containing 10% FBS, 5 X 10^{-5}M 2ME, 100U/ml penicillin, 10ug/ml streptomycin, and 10^{-5} dilution of SAC) in a total volume of 150ul. Proliferation or inhibition is quantitated by a 20h pulse (1uCi/well)

with 3H-thymidine (6.7 Ci/mM) beginning 72h post factor addition. The positive and negative controls are IL2 and medium respectively.

In Vivo Assay- BALB/c mice are injected (i.p.) twice per day with buffer only, or 2 mg/Kg of agonists or antagonists of the invention, or truncated forms thereof. Mice receive this treatment for 4 consecutive days, at which time they are sacrificed and various tissues and serum collected for analyses. Comparison of H&E sections from normal spleens and spleens treated with agonists or antagonists of the invention identify the results of the activity of the agonists or antagonists on spleen cells, such as the diffusion of peri-arterial lymphatic sheaths, and/or significant increases in the nucleated cellularity of the red pulp regions, which may indicate the activation of the differentiation and proliferation of B-cell populations. Immunohistochemical studies using a B cell marker, anti-CD45R(B220), are used to determine whether any physiological changes to splenic cells, such as splenic disorganization, are due to increased B-cell representation within loosely defined B-cell zones that infiltrate established T-cell regions.

Flow cytometric analyses of the spleens from mice treated with agonist or antagonist is used to indicate whether the agonists or antagonists specifically increases the proportion of ThB+, CD45R(B220)dull B cells over that which is observed in control mice.

Likewise, a predicted consequence of increased mature B-cell representation in vivo is a relative increase in serum Ig titers. Accordingly, serum IgM and IgA levels are compared between buffer and agonists or antagonists-treated mice.

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 23: T Cell Proliferation Assay

A CD3-induced proliferation assay is performed on PBMCs and is measured by the uptake of ^{3}H-thymidine. The assay is performed as follows. Ninety-six well plates are coated with 100 µl/well of mAb to CD3 (HIT3a, Pharmingen) or isotype-matched control mAb (B33.1) overnight at 4 degrees C (1 µg/ml in .05M bicarbonate buffer, pH 9.5), then washed three times with PBS. PBMC are isolated by F/H gradient centrifugation from human peripheral blood and added to quadruplicate wells (5 x 10^{4}/well) of mAb coated plates

in RPMI containing 10% FCS and P/S in the presence of varying concentrations of agonists or antagonists of the invention (total volume 200 ul). Relevant protein buffer and medium alone are controls. After 48 hr. culture at 37 degrees C, plates are spun for 2 min. at 1000 rpm and 100 μl of supernatant is removed and stored –20 degrees C for measurement of IL-2 (or other cytokines) if effect on proliferation is observed. Wells are supplemented with 100 ul of medium containing 0.5 uCi of ^{3}H-thymidine and cultured at 37 degrees C for 18-24 hr. Wells are harvested and incorporation of ^{3}H-thymidine used as a measure of proliferation. Anti-CD3 alone is the positive control for proliferation. IL-2 (100 U/ml) is also used as a control which enhances proliferation. Control antibody which does not induce proliferation of T cells is used as the negative controls for the effects of agonists or antagonists of the invention.

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 24: Effect of Agonists or Antagonists of the Invention on the Expression of MHC Class II, Costimulatory and Adhesion Molecules and Cell Differentiation of Monocytes and Monocyte-Derived Human Dendritic Cells

Dendritic cells are generated by the expansion of proliferating precursors found in the peripheral blood: adherent PBMC or elutriated monocytic fractions are cultured for 7-10 days with GM-CSF (50 ng/ml) and IL-4 (20 ng/ml). These dendritic cells have the characteristic phenotype of immature cells (expression of CD1, CD80, CD86, CD40 and MHC class II antigens). Treatment with activating factors, such as TNF-α, causes a rapid change in surface phenotype (increased expression of MHC class I and II, costimulatory and adhesion molecules, downregulation of FCγRII, upregulation of CD83). These changes correlate with increased antigen-presenting capacity and with functional maturation of the dendritic cells.

FACS analysis of surface antigens is performed as follows. Cells are treated 1-3 days with increasing concentrations of agonist or antagonist of the invention or LPS (positive control), washed with PBS containing 1% BSA and 0.02 mM sodium azide, and then incubated with 1:20 dilution of appropriate FITC- or PE-labeled monoclonal antibodies for 30 minutes at 4 degrees C. After an additional wash, the labeled cells are analyzed by flow

cytometry on a FACScan (Becton Dickinson).

Effect on the production of cytokines. Cytokines generated by dendritic cells, in particular IL-12, are important in the initiation of T-cell dependent immune responses. IL-12 strongly influences the development of Thl helper T-cell immune response, and induces cytotoxic T and NK cell function. An ELISA is used to measure the IL-12 release as follows. Dendritic cells (10^6/ml) are treated with increasing concentrations of agonists or antagonists of the invention for 24 hours. LPS (100 ng/ml) is added to the cell culture as positive control. Supernatants from the cell cultures are then collected and analyzed for IL-12 content using commercial ELISA kit (e..g, R & D Systems (Minneapolis, MN)). The standard protocols provided with the kits are used.

Effect on the expression of MHC Class II, costimulatory and adhesion molecules. Three major families of cell surface antigens can be identified on monocytes: adhesion molecules, molecules involved in antigen presentation, and Fc receptor. Modulation of the expression of MHC class II antigens and other costimulatory molecules, such as B7 and ICAM-1, may result in changes in the antigen presenting capacity of monocytes and ability to induce T cell activation. Increase expression of Fc receptors may correlate with improved monocyte cytotoxic activity, cytokine release and phagocytosis.

FACS analysis is used to examine the surface antigens as follows. Monocytes are treated 1-5 days with increasing concentrations of agonists or antagonists of the invention or LPS (positive control), washed with PBS containing 1% BSA and 0.02 mM sodium azide, and then incubated with 1:20 dilution of appropriate FITC- or PE-labeled monoclonal antibodies for 30 minutes at 4 degreesC. After an additional wash, the labeled cells are analyzed by flow cytometry on a FACScan (Becton Dickinson).

Monocyte activation and/or increased survival. Assays for molecules that activate (or alternatively, inactivate) monocytes and/or increase monocyte survival (or alternatively, decrease monocyte survival) are known in the art and may routinely be applied to determine whether a molecule of the invention functions as an inhibitor or activator of monocytes. Agonists or antagonists of the invention can be screened using the three assays described below. For each of these assays, Peripheral blood mononuclear cells (PBMC) are purified

from single donor leukopacks (American Red Cross, Baltimore, MD) by centrifugation through a Histopaque gradient (Sigma). Monocytes are isolated from PBMC by counterflow centrifugal elutriation.

Monocyte Survival Assay. Human peripheral blood monocytes progressively lose viability when cultured in absence of serum or other stimuli. Their death results from internally regulated process (apoptosis). Addition to the culture of activating factors, such as TNF-alpha dramatically improves cell survival and prevents DNA fragmentation. Propidium iodide (PI) staining is used to measure apoptosis as follows. Monocytes are cultured for 48 hours in polypropylene tubes in serum-free medium (positive control), in the presence of 100 ng/ml TNF-alpha (negative control), and in the presence of varying concentrations of the compound to be tested. Cells are suspended at a concentration of 2 x 10^6/ml in PBS containing PI at a final concentration of 5 μg/ml, and then incubaed at room temperature for 5 minutes before FACScan analysis. PI uptake has been demonstrated to correlate with DNA fragmentation in this experimental paradigm.

Effect on cytokine release. An important function of monocytes/macrophages is their regulatory activity on other cellular populations of the immune system through the release of cytokines after stimulation. An ELISA to measure cytokine release is performed as follows. Human monocytes are incubated at a density of $5x10^5$ cells/ml with increasing concentrations of agonists or antagonists of the invention and under the same conditions, but in the absence of agonists or antagonists. For IL-12 production, the cells are primed overnight with IFN (100 U/ml) in presence of agonist or antagonist of the invention. LPS (10 ng/ml) is then added. Conditioned media are collected after 24h and kept frozen until use. Measurement of TNF-alpha, IL-10, MCP-1 and IL-8 is then performed using a commercially available ELISA kit (e. g, R & D Systems (Minneapolis, MN)) and applying the standard protocols provided with the kit.

Oxidative burst. Purified monocytes are plated in 96-w plate at $2\text{-}1x10^5$ cell/well. Increasing concentrations of agonists or antagonists of the invention are added to the wells in a total volume of 0.2 ml culture medium (RPMI 1640 + 10% FCS, glutamine and antibiotics). After 3 days incubation, the plates are centrifuged and the medium is removed from the wells. To

the macrophage monolayers, 0.2 ml per well of phenol red solution (140 mM NaCl, 10 mM potassium phosphate buffer pH 7.0, 5.5 mM dextrose, 0.56 mM phenol red and 19 U/ml of HRPO) is added, together with the stimulant (200 nM PMA). The plates are incubated at 37°C for 2 hours and the reaction is stopped by adding 20 µl 1N NaOH per well. The absorbance is read at 610 nm. To calculate the amount of H_2O_2 produced by the macrophages, a standard curve of a H_2O_2 solution of known molarity is performed for each experiment.

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 25: Biological Effects of Agonists or Antagonists of the Invention

Astrocyte and Neuronal Assays.

Agonists or antagonists of the invention, expressed in *Escherichia coli* and purified as described above, can be tested for activity in promoting the survival, neurite outgrowth, or phenotypic differentiation of cortical neuronal cells and for inducing the proliferation of glial fibrillary acidic protein immunopositive cells, astrocytes. The selection of cortical cells for the bioassay is based on the prevalent expression of FGF-1 and FGF-2 in cortical structures and on the previously reported enhancement of cortical neuronal survival resulting from FGF-2 treatment. A thymidine incorporation assay, for example, can be used to elucidate an agonist or antagonist of the invention's activity on these cells.

Moreover, previous reports describing the biological effects of FGF-2 (basic FGF) on cortical or hippocampal neurons *in vitro* have demonstrated increases in both neuron survival and neurite outgrowth (Walicke et al., "Fibroblast growth factor promotes survival of dissociated hippocampal neurons and enhances neurite extension." *Proc. Natl. Acad. Sci. USA 83*:3012-3016. (1986), assay herein incorporated by reference in its entirety). However, reports from experiments done on PC-12 cells suggest that these two responses are not necessarily synonymous and may depend on not only which FGF is being tested but also on which receptor(s) are expressed on the target cells. Using the primary cortical neuronal

culture paradigm, the ability of an agonist or antagonist of the invention to induce neurite outgrowth can be compared to the response achieved with FGF-2 using, for example, a thymidine incorporation assay.

Fibroblast and endothelial cell assays.

Human lung fibroblasts are obtained from Clonetics (San Diego, CA) and maintained in growth media from Clonetics. Dermal microvascular endothelial cells are obtained from Cell Applications (San Diego, CA). For proliferation assays, the human lung fibroblasts and dermal microvascular endothelial cells can be cultured at 5,000 cells/well in a 96-well plate for one day in growth medium. The cells are then incubated for one day in 0.1% BSA basal medium. After replacing the medium with fresh 0.1% BSA medium, the cells are incubated with the test proteins for 3 days. Alamar Blue (Alamar Biosciences, Sacramento, CA) is added to each well to a final concentration of 10%. The cells are incubated for 4 hr. Cell viability is measured by reading in a CytoFluor fluorescence reader. For the PGE_2 assays, the human lung fibroblasts are cultured at 5,000 cells/well in a 96-well plate for one day. After a medium change to 0.1% BSA basal medium, the cells are incubated with FGF-2 or agonists or antagonists of the invention with or without IL-1α for 24 hours. The supernatants are collected and assayed for PGE_2 by EIA kit (Cayman, Ann Arbor, MI). For the IL-6 assays, the human lung fibroblasts are cultured at 5,000 cells/well in a 96-well plate for one day. After a medium change to 0.1% BSA basal medium, the cells are incubated with FGF-2 or with or without agonists or antagonists of the invention IL-1α for 24 hours. The supernatants are collected and assayed for IL-6 by ELISA kit (Endogen, Cambridge, MA).

Human lung fibroblasts are cultured with FGF-2 or agonists or antagonists of the invention for 3 days in basal medium before the addition of Alamar Blue to assess effects on growth of the fibroblasts. FGF-2 should show a stimulation at 10 - 2500 ng/ml which can be used to compare stimulation with agonists or antagonists of the invention.

Parkinson Models.

The loss of motor function in Parkinson's disease is attributed to a deficiency of striatal dopamine resulting from the degeneration of the nigrostriatal dopaminergic projection

neurons. An animal model for Parkinson's that has been extensively characterized involves the systemic administration of 1-methyl-4 phenyl 1,2,3,6-tetrahydropyridine (MPTP). In the CNS, MPTP is taken-up by astrocytes and catabolized by monoamine oxidase B to 1-methyl-4-phenyl pyridine (MPP^+) and released. Subsequently, MPP^+ is actively accumulated in dopaminergic neurons by the high-affinity reuptake transporter for dopamine. MPP^+ is then concentrated in mitochondria by the electrochemical gradient and selectively inhibits nicotidamide adenine disphosphate: ubiquinone oxidoreductionase (complex I), thereby interfering with electron transport and eventually generating oxygen radicals.

It has been demonstrated in tissue culture paradigms that FGF-2 (basic FGF) has trophic activity towards nigral dopaminergic neurons (Ferrari et al., Dev. Biol. 1989). Recently, Dr. Unsicker's group has demonstrated that administering FGF-2 in gel foam implants in the striatum results in the near complete protection of nigral dopaminergic neurons from the toxicity associated with MPTP exposure (Otto and Unsicker, J. Neuroscience, 1990).

Based on the data with FGF-2, agonists or antagonists of the invention can be evaluated to determine whether it has an action similar to that of FGF-2 in enhancing dopaminergic neuronal survival *in vitro* and it can also be tested *in vivo* for protection of dopaminergic neurons in the striatum from the damage associated with MPTP treatment. The potential effect of an agonist or antagonist of the invention is first examined in vitro in a dopaminergic neuronal cell culture paradigm. The cultures are prepared by dissecting the midbrain floor plate from gestation day 14 Wistar rat embryos. The tissue is dissociated with trypsin and seeded at a density of 200,000 cells/cm^2 on polyorthinine-laminin coated glass coverslips. The cells are maintained in Dulbecco's Modified Eagle's medium and F12 medium containing hormonal supplements (N1). The cultures are fixed with paraformaldehyde after 8 days in vitro and are processed for tyrosine hydroxylase, a specific marker for dopminergic neurons, immunohistochemical staining. Dissociated cell cultures are prepared from embryonic rats. The culture medium is changed every third day and the factors are also added at that time.

Since the dopaminergic neurons are isolated from animals at gestation day 14, a developmental time which is past the stage when the dopaminergic precursor cells are proliferating, an increase in the number of tyrosine hydroxylase immunopositive neurons would represent an increase in the number of dopaminergic neurons surviving *in vitro*.

Therefore, if an agonist or antagonist of the invention acts to prolong the survival of dopaminergic neurons, it would suggest that the agonist or antagonist may be involved in Parkinson's Disease.

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 26: The Effect of Agonists or Antagonists of the Invention on the Growth of Vascular Endothelial Cells

On day 1, human umbilical vein endothelial cells (HUVEC) are seeded at 2-5x10^4 cells/35 mm dish density in M199 medium containing 4% fetal bovine serum (FBS), 16 units/ml heparin, and 50 units/ml endothelial cell growth supplements (ECGS, Biotechnique, Inc.). On day 2, the medium is replaced with M199 containing 10% FBS, 8 units/ml heparin. An agonist or antagonist of the invention, and positive controls, such as VEGF and basic FGF (bFGF) are added, at varying concentrations. On days 4 and 6, the medium is replaced. On day 8, cell number is determined with a Coulter Counter.

An increase in the number of HUVEC cells indicates that the compound of the invention may proliferate vascular endothelial cells, while a decrease in the number of HUVEC cell indicates that the compound of the invention inhibits vascular endothelial cells.

The studies described in this example tested activity of a polypeptide of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides (e.g., gene therapy), agonists, and/or antagonists of the invention.

Example 27: Rat Corneal Wound Healing Model

This animal model shows the effect of an agonist or antagonist of the invention on neovascularization. The experimental protocol includes:

a) Making a 1-1.5 mm long incision from the center of cornea into the stromal layer.

b) Inserting a spatula below the lip of the incision facing the outer corner of the

eye.

c) Making a pocket (its base is 1-1.5 mm form the edge of the eye).

d) Positioning a pellet, containing 50ng- 5ug of an agonist or antagonist of the invention, within the pocket.

e) Treatment with an agonist or antagonist of the invention can also be applied topically to the corneal wounds in a dosage range of 20mg - 500mg (daily treatment for five days).

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 28: Diabetic Mouse and Glucocorticoid-Impaired Wound Healing Models

A. Diabetic db+/db+ Mouse Model.

To demonstrate that an agonist or antagonist of the invention accelerates the healing process, the genetically diabetic mouse model of wound healing is used. The full thickness wound healing model in the db+/db+ mouse is a well characterized, clinically relevant and reproducible model of impaired wound healing. Healing of the diabetic wound is dependent on formation of granulation tissue and re-epithelialization rather than contraction (Gartner, M.H. *et al., J. Surg. Res. 52*:389 (1992); Greenhalgh, D.G. *et al., Am. J. Pathol. 136*:1235 (1990)).

The diabetic animals have many of the characteristic features observed in Type II diabetes mellitus. Homozygous (db+/db+) mice are obese in comparison to their normal heterozygous (db+/+m) littermates. Mutant diabetic (db+/db+) mice have a single autosomal recessive mutation on chromosome 4 (db+) (Coleman *et al. Proc. Natl. Acad. Sci. USA 77*:283-293 (1982)). Animals show polyphagia, polydipsia and polyuria. Mutant diabetic mice (db+/db+) have elevated blood glucose, increased or normal insulin levels, and suppressed cell-mediated immunity (Mandel *et al., J. Immunol. 120*:1375 (1978); Debray-Sachs, M. *et al., Clin. Exp. Immunol. 51(1)*:1-7 (1983); Leiter *et al., Am. J. of Pathol. 114*:46-55 (1985)). Peripheral neuropathy, myocardial complications, and microvascular lesions, basement membrane thickening and glomerular filtration abnormalities have been described in these animals (Norido, F. *et al., Exp. Neurol. 83(2)*:221-232 (1984); Robertson *et al.*,

Diabetes 29(1):60-67 (1980); Giacomelli *et al.*. *Lab Invest. 40(4)*:460-473 (1979); Coleman, D.L., *Diabetes 31 (Suppl)*:1-6 (1982)). These homozygous diabetic mice develop hyperglycemia that is resistant to insulin analogous to human type II diabetes (Mandel *et al.*, *J. Immunol. 120*:1375-1377 (1978)).

The characteristics observed in these animals suggests that healing in this model may be similar to the healing observed in human diabetes (Greenhalgh, *et al., Am. J. of Pathol. 136*:1235-1246 (1990)).

Genetically diabetic female C57BL/KsJ (db+/db+) mice and their non-diabetic (db+/+m) heterozygous littermates are used in this study (Jackson Laboratories). The animals are purchased at 6 weeks of age and are 8 weeks old at the beginning of the study. Animals are individually housed and received food and water ad libitum. All manipulations are performed using aseptic techniques. The experiments are conducted according to the rules and guidelines of Human Genome Sciences, Inc. Institutional Animal Care and Use Committee and the Guidelines for the Care and Use of Laboratory Animals.

Wounding protocol is performed according to previously reported methods (Tsuboi, R. and Rifkin, D.B., *J. Exp. Med. 172*:245-251 (1990)). Briefly, on the day of wounding, animals are anesthetized with an intraperitoneal injection of Avertin (0.01 mg/mL), 2,2,2-tribromoethanol and 2-methyl-2-butanol dissolved in deionized water. The dorsal region of the animal is shaved and the skin washed with 70% ethanol solution and iodine. The surgical area is dried with sterile gauze prior to wounding. An 8 mm full-thickness wound is then created using a Keyes tissue punch. Immediately following wounding, the surrounding skin is gently stretched to eliminate wound expansion. The wounds are left open for the duration of the experiment. Application of the treatment is given topically for 5 consecutive days commencing on the day of wounding. Prior to treatment, wounds are gently cleansed with sterile saline and gauze sponges.

Wounds are visually examined and photographed at a fixed distance at the day of surgery and at two day intervals thereafter. Wound closure is determined by daily measurement on days 1-5 and on day 8. Wounds are measured horizontally and vertically using a calibrated Jameson caliper. Wounds are considered healed if granulation tissue is no longer visible and the wound is covered by a continuous epithelium.

An agonist or antagonist of the invention is administered using at a range different doses, from 4mg to 500mg per wound per day for 8 days in vehicle. Vehicle control groups

received 50mL of vehicle solution.

Animals are euthanized on day 8 with an intraperitoneal injection of sodium pentobarbital (300mg/kg). The wounds and surrounding skin are then harvested for histology and immunohistochemistry. Tissue specimens are placed in 10% neutral buffered formalin in tissue cassettes between biopsy sponges for further processing.

Three groups of 10 animals each (5 diabetic and 5 non-diabetic controls) are evaluated: 1) Vehicle placebo control, 2) untreated group, and 3) treated group.

Wound closure is analyzed by measuring the area in the vertical and horizontal axis and obtaining the total square area of the wound. Contraction is then estimated by establishing the differences between the initial wound area (day 0) and that of post treatment (day 8). The wound area on day 1 is $64mm^2$, the corresponding size of the dermal punch. Calculations are made using the following formula:

[Open area on day 8] - [Open area on day 1] / [Open area on day 1]

Specimens are fixed in 10% buffered formalin and paraffin embedded blocks are sectioned perpendicular to the wound surface (5mm) and cut using a Reichert-Jung microtome. Routine hematoxylin-eosin (H&E) staining is performed on cross-sections of bisected wounds. Histologic examination of the wounds are used to assess whether the healing process and the morphologic appearance of the repaired skin is altered by treatment with an agonist or antagonist of the invention. This assessment included verification of the presence of cell accumulation, inflammatory cells, capillaries, fibroblasts, re-epithelialization and epidermal maturity (Greenhalgh, D.G. *et al., Am. J. Pathol. 136:*1235 (1990)). A calibrated lens micrometer is used by a blinded observer.

Tissue sections are also stained immunohistochemically with a polyclonal rabbit anti-human keratin antibody using ABC Elite detection system. Human skin is used as a positive tissue control while non-immune IgG is used as a negative control. Keratinocyte growth is determined by evaluating the extent of reepithelialization of the wound using a calibrated lens micrometer.

Proliferating cell nuclear antigen/cyclin (PCNA) in skin specimens is demonstrated by using anti-PCNA antibody (1:50) with an ABC Elite detection system. Human colon cancer served as a positive tissue control and human brain tissue is used as a negative tissue

control. Each specimen included a section with omission of the primary antibody and substitution with non-immune mouse IgG. Ranking of these sections is based on the extent of proliferation on a scale of 0-8, the lower side of the scale reflecting slight proliferation to the higher side reflecting intense proliferation.

Experimental data are analyzed using an unpaired t test. A p value of < 0.05 is considered significant.

B. Steroid Impaired Rat Model

The inhibition of wound healing by steroids has been well documented in various *in vitro* and *in vivo* systems (Wahl, Glucocorticoids and Wound healing. In: Anti-Inflammatory Steroid Action: Basic and Clinical Aspects. 280-302 (1989); Wahl*et al., J. Immunol. 115*: 476-481 (1975); Werb *et al., J. Exp. Med. 147*:1684-1694 (1978)). Glucocorticoids retard wound healing by inhibiting angiogenesis, decreasing vascular permeability (Ebert *et al., An. Intern. Med. 37*:701-705 (1952)), fibroblast proliferation, and collagen synthesis (Beck *et al., Growth Factors. 5:* 295-304 (1991); Haynes *et al., J. Clin. Invest. 61:* 703-797 (1978)) and producing a transient reduction of circulating monocytes (Haynes et al., *J. Clin. Invest. 61:* 703-797 (1978); Wahl, "Glucocorticoids and wound healing", *In:* Antiinflammatory Steroid Action: Basic and Clinical Aspects, Academic Press, New York, pp. 280-302 (1989)). The systemic administration of steroids to impaired wound healing is a well establish phenomenon in rats (Beck *et al., Growth Factors. 5:* 295-304 (1991); Haynes *et al., J. Clin. Invest. 61:* 703-797 (1978); Wahl, "Glucocorticoids and wound healing", *In*: Antiinflammatory Steroid Action: Basic and Clinical Aspects, Academic Press, New York, pp. 280-302 (1989); Pierce *et al., Proc. Natl. Acad. Sci. USA 86*: 2229-2233 (1989)).

To demonstrate that an agonist or antagonist of the invention can accelerate the healing process, the effects of multiple topical applications of the agonist or antagonist on full thickness excisional skin wounds in rats in which healing has been impaired by the systemic administration of methylprednisolone is assessed.

Young adult male Sprague Dawley rats weighing 250-300 g (Charles River Laboratories) are used in this example. The animals are purchased at 8 weeks of age and are 9 weeks old at the beginning of the study. The healing response of rats is impaired by the systemic administration of methylprednisolone (17mg/kg/rat intramuscularly) at the time of wounding. Animals are individually housed and received food and water *ad libitum*. All

manipulations are performed using aseptic techniques. This study is conducted according to the rules and guidelines of Human Genome Sciences, Inc. Institutional Animal Care and Use Committee and the Guidelines for the Care and Use of Laboratory Animals.

The wounding protocol is followed according to section A, above. On the day of wounding, animals are anesthetized with an intramuscular injection of ketamine (50 mg/kg) and xylazine (5 mg/kg). The dorsal region of the animal is shaved and the skin washed with 70% ethanol and iodine solutions. The surgical area is dried with sterile gauze prior to wounding. An 8 mm full-thickness wound is created using a Keyes tissue punch. The wounds are left open for the duration of the experiment. Applications of the testing materials are given topically once a day for 7 consecutive days commencing on the day of wounding and subsequent to methylprednisolone administration. Prior to treatment, wounds are gently cleansed with sterile saline and gauze sponges.

Wounds are visually examined and photographed at a fixed distance at the day of wounding and at the end of treatment. Wound closure is determined by daily measurement on days 1-5 and on day 8. Wounds are measured horizontally and vertically using a calibrated Jameson caliper. Wounds are considered healed if granulation tissue is no longer visible and the wound is covered by a continuous epithelium.

The agonist or antagonist of the invention is administered using at a range different doses, from 4mg to 500mg per wound per day for 8 days in vehicle. Vehicle control groups received 50mL of vehicle solution.

Animals are euthanized on day 8 with an intraperitoneal injection of sodium pentobarbital (300mg/kg). The wounds and surrounding skin are then harvested for histology. Tissue specimens are placed in 10% neutral buffered formalin in tissue cassettes between biopsy sponges for further processing.

Four groups of 10 animals each (5 with methylprednisolone and 5 without glucocorticoid) are evaluated: 1) Untreated group 2) Vehicle placebo control 3) treated groups.

Wound closure is analyzed by measuring the area in the vertical and horizontal axis and obtaining the total area of the wound. Closure is then estimated by establishing the differences between the initial wound area (day 0) and that of post treatment (day 8). The wound area on day 1 is $64mm^2$, the corresponding size of the dermal punch. Calculations are made using the following formula:

[Open area on day 8] - [Open area on day 1] / [Open area on day 1]

Specimens are fixed in 10% buffered formalin and paraffin embedded blocks are sectioned perpendicular to the wound surface (5mm) and cut using an Olympus microtome. Routine hematoxylin-eosin (H&E) staining is performed on cross-sections of bisected wounds. Histologic examination of the wounds allows assessment of whether the healing process and the morphologic appearance of the repaired skin is improved by treatment with an agonist or antagonist of the invention. A calibrated lens micrometer is used by a blinded observer to determine the distance of the wound gap.

Experimental data are analyzed using an unpaired t test. A p value of < 0.05 is considered significant.

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 29: Lymphadema Animal Model

The purpose of this experimental approach is to create an appropriate and consistent lymphedema model for testing the therapeutic effects of an agonist or antagonist of the invention in lymphangiogenesis and re-establishment of the lymphatic circulatory system in the rat hind limb. Effectiveness is measured by swelling volume of the affected limb, quantification of the amount of lymphatic vasculature, total blood plasma protein, and histopathology. Acute lymphedema is observed for 7-10 days. Perhaps more importantly, the chronic progress of the edema is followed for up to 3-4 weeks.

Prior to beginning surgery, blood sample is drawn for protein concentration analysis. Male rats weighing approximately ~350g are dosed with Pentobarbital. Subsequently, the right legs are shaved from knee to hip. The shaved area is swabbed with gauze soaked in 70% EtOH. Blood is drawn for serum total protein testing. Circumference and volumetric measurements are made prior to injecting dye into paws after marking 2 measurement levels (0.5 cm above heel, at mid-pt of dorsal paw). The intradermal dorsum of both right and left paws are injected with 0.05 ml of 1% Evan's Blue. Circumference and volumetric

measurements are then made following injection of dye into paws.

Using the knee joint as a landmark, a mid-leg inguinal incision is made circumferentially allowing the femoral vessels to be located. Forceps and hemostats are used to dissect and separate the skin flaps. After locating the femoral vessels, the lymphatic vessel that runs along side and underneath the vessel(s) is located. The main lymphatic vessels in this area are then electrically coagulated or suture ligated.

Using a microscope, muscles in back of the leg (near the semitendinosis and adductors) are bluntly dissected. The popliteal lymph node is then located. The 2 proximal and 2 distal lymphatic vessels and distal blood supply of the popliteal node are then and ligated by suturing. The popliteal lymph node, and any accompanying adipose tissue, is then removed by cutting connective tissues.

Care is taken to control any mild bleeding resulting from this procedure. After lymphatics are occluded, the skin flaps are sealed by using liquid skin (Vetbond) (AJ Buck). The separated skin edges are sealed to the underlying muscle tissue while leaving a gap of ~0.5 cm around the leg. Skin also may be anchored by suturing to underlying muscle when necessary.

To avoid infection, animals are housed individually with mesh (no bedding). Recovering animals are checked daily through the optimal edematous peak, which typically occurred by day 5-7. The plateau edematous peak are then observed. To evaluate the intensity of the lymphedema, the circumference and volumes of 2 designated places on each paw before operation and daily for 7 days are measured. The effect plasma proteins on lymphedema is determined and whether protein analysis is a useful testing perimeter is also investigated. The weights of both control and edematous limbs are evaluated at 2 places. Analysis is performed in a blind manner.

Circumference Measurements: Under brief gas anesthetic to prevent limb movement, a cloth tape is used to measure limb circumference. Measurements are done at the ankle bone and dorsal paw by 2 different people then those 2 readings are averaged. Readings are taken from both control and edematous limbs.

Volumetric Measurements: On the day of surgery, animals are anesthetized with Pentobarbital and are tested prior to surgery. For daily volumetrics animals are under brief halothane anesthetic (rapid immobilization and quick recovery), both legs are shaved and equally marked using waterproof marker on legs. Legs are first dipped in water, then dipped

into instrument to each marked level then measured by Buxco edema software(Chen/Victor). Data is recorded by one person, while the other is dipping the limb to marked area.

Blood-plasma protein measurements: Blood is drawn, spun, and serum separated prior to surgery and then at conclusion for total protein and Ca2+ comparison.

Limb Weight Comparison: After drawing blood, the animal is prepared for tissue collection. The limbs are amputated using a quillitine, then both experimental and control legs are cut at the ligature and weighed. A second weighing is done as the tibio-cacaneal joint is disarticulated and the foot is weighed.

Histological Preparations: The transverse muscle located behind the knee (popliteal) area is dissected and arranged in a metal mold, filled with freezeGel, dipped into cold methylbutane, placed into labeled sample bags at - 80EC until sectioning. Upon sectioning, the muscle is observed under fluorescent microscopy for lymphatics..

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 30: Suppression of TNF alpha-induced adhesion molecule expression by a Agonist or Antagonist of the Invention

The recruitment of lymphocytes to areas of inflammation and angiogenesis involves specific receptor-ligand interactions between cell surface adhesion molecules (CAMs) on lymphocytes and the vascular endothelium. The adhesion process, in both normal and pathological settings, follows a multi-step cascade that involves intercellular adhesion molecule-1 (ICAM-1), vascular cell adhesion molecule-1 (VCAM-1), and endothelial leukocyte adhesion molecule-1 (E-selectin) expression on endothelial cells (EC). The expression of these molecules and others on the vascular endothelium determines the efficiency with which leukocytes may adhere to the local vasculature and extravasate into the local tissue during the development of an inflammatory response. The local concentration of cytokines and growth factor participate in the modulation of the expression of these CAMs.

Tumor necrosis factor alpha (TNF-a), a potent proinflammatory cytokine, is a stimulator of all three CAMs on endothelial cells and may be involved in a wide variety of inflammatory responses, often resulting in a pathological outcome.

The potential of an agonist or antagonist of the invention to mediate a suppression of TNF-a induced CAM expression can be examined. A modified ELISA assay which uses ECs as a solid phase absorbent is employed to measure the amount of CAM expression on TNF-a treated ECs when co-stimulated with a member of the FGF family of proteins.

To perform the experiment, human umbilical vein endothelial cell (HUVEC) cultures are obtained from pooled cord harvests and maintained in growth medium (EGM-2; Clonetics, San Diego, CA) supplemented with 10% FCS and 1% penicillin/streptomycin in a 37 degree C humidified incubator containing 5% CO_2. HUVECs are seeded in 96-well plates at concentrations of 1 x 10^4 cells/well in EGM medium at 37 degree C for 18-24 hrs or until confluent. The monolayers are subsequently washed 3 times with a serum-free solution of RPMI-1640 supplemented with 100 U/ml penicillin and 100 mg/ml streptomycin, and treated with a given cytokine and/or growth factor(s) for 24 h at 37 degree C. Following incubation, the cells are then evaluated for CAM expression.

Human Umbilical Vein Endothelial cells (HUVECs) are grown in a standard 96 well plate to confluence. Growth medium is removed from the cells and replaced with 90 ul of 199 Medium (10% FBS). Samples for testing and positive or negative controls are added to the plate in triplicate (in 10 ul volumes). Plates are incubated at 37 degree C for either 5 h (selectin and integrin expression) or 24 h (integrin expression only). Plates are aspirated to remove medium and 100 µl of 0.1% paraformaldehyde-PBS(with Ca++ and Mg++) is added to each well. Plates are held at 4°C for 30 min.

Fixative is then removed from the wells and wells are washed 1X with PBS(+Ca,Mg)+0.5% BSA and drained. Do not allow the wells to dry. Add 10 µl of diluted primary antibody to the test and control wells. Anti-ICAM-1-Biotin, Anti-VCAM-1-Biotin and Anti-E-selectin-Biotin are used at a concentration of 10 µg/ml (1:10 dilution of 0.1 mg/ml stock antibody). Cells are incubated at 37°C for 30 min. in a humidified environment. Wells are washed X3 with PBS(+Ca,Mg)+0.5% BSA.

Then add 20 µl of diluted ExtrAvidin-Alkaline Phosphotase (1:5,000 dilution) to each well and incubated at 37°C for 30 min. Wells are washed X3 with PBS(+Ca,Mg)+0.5% BSA. 1 tablet of p-Nitrophenol Phosphate pNPP is dissolved in 5 ml of glycine buffer (pH 10.4). 100 µl of pNPP substrate in glycine buffer is added to each test well. Standard wells in triplicate are prepared from the working dilution of the ExtrAvidin-Alkaline Phosphotase in glycine buffer: 1:5,000 (10^0) > $10^{-0.5}$ > 10^{-1} > $10^{-1.5}$. 5 µl of each dilution is added to triplicate

wells and the resulting AP content in each well is 5.50 ng, 1.74 ng, 0.55 ng, 0.18 ng. 100 µl of pNNP reagent must then be added to each of the standard wells. The plate must be incubated at 37°C for 4h. A volume of 50 µl of 3M NaOH is added to all wells. The results are quantified on a plate reader at 405 nm. The background subtraction option is used on blank wells filled with glycine buffer only. The template is set up to indicate the concentration of AP-conjugate in each standard well [5.50 ng; 1.74 ng; 0.55 ng; 0.18 ng]. Results are indicated as amount of bound AP-conjugate in each sample.

The studies described in this example tested activity of agonists or antagonists of the invention. However, one skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides or polypeptides of the invention (e.g., gene therapy).

Example 31: Production Of Polypeptide of the Invention For High-Throughput Screening Assays

The following protocol produces a supernatant containing polypeptide of the present invention to be tested. This supernatant can then be used in the Screening Assays described in Examples 33-42.

First, dilute Poly-D-Lysine (644 587 Boehringer-Mannheim) stock solution (1mg/ml in PBS) 1:20 in PBS (w/o calcium or magnesium 17-516F Biowhittaker) for a working solution of 50ug/ml. Add 200 ul of this solution to each well (24 well plates) and incubate at RT for 20 minutes. Be sure to distribute the solution over each well (note: a 12-channel pipetter may be used with tips on every other channel). Aspirate off the Poly-D-Lysine solution and rinse with 1ml PBS (Phosphate Buffered Saline). The PBS should remain in the well until just prior to plating the cells and plates may be poly-lysine coated in advance for up to two weeks.

Plate 293T cells (do not carry cells past P+20) at 2 x 10^5 cells/well in .5ml DMEM(Dulbecco's Modified Eagle Medium)(with 4.5 G/L glucose and L-glutamine (12-604F Biowhittaker))/10% heat inactivated FBS(14-503F Biowhittaker)/1x Penstrep(17-602E Biowhittaker). Let the cells grow overnight.

The next day, mix together in a sterile solution basin: 300 ul Lipofectamine (18324-012 Gibco/BRL) and 5ml Optimem I (31985070 Gibco/BRL)/96-well plate. With a small volume multi-channel pipetter, aliquot approximately 2ug of an expression vector containing

a polynucleotide insert, produced by the methods described in Examples 8-10, into an appropriately labeled 96-well round bottom plate. With a multi-channel pipetter, add 50ul of the Lipofectamine/Optimem I mixture to each well. Pipette up and down gently to mix. Incubate at RT 15-45 minutes. After about 20 minutes, use a multi-channel pipetter to add 150ul Optimem I to each well. As a control, one plate of vector DNA lacking an insert should be transfected with each set of transfections.

Preferably, the transfection should be performed by tag-teaming the following tasks. By tag-teaming, hands on time is cut in half, and the cells do not spend too much time on PBS. First, person A aspirates off the media from four 24-well plates of cells, and then person B rinses each well with .5-1ml PBS. Person A then aspirates off PBS rinse, and person B, using a12-channel pipetter with tips on every other channel, adds the 200ul of DNA/Lipofectamine/Optimem I complex to the odd wells first, then to the even wells, to each row on the 24-well plates. Incubate at 37 degree C for 6 hours.

While cells are incubating, prepare appropriate media, either 1%BSA in DMEM with 1x penstrep, or HGS CHO-5 media (116.6 mg/L of CaCl2 (anhyd); 0.00130 mg/L $CuSO_4$-$5H_2O$; 0.050 mg/L of $Fe(NO_3)_3$-$9H_2O$; 0.417 mg/L of $FeSO_4$-$7H_2O$; 311.80 mg/L of Kcl; 28.64 mg/L of $MgCl_2$; 48.84 mg/L of $MgSO_4$; 6995.50 mg/L of NaCl; 2400.0 mg/L of $NaHCO_3$; 62.50 mg/L of NaH_2PO_4-H_20; 71.02 mg/L of Na_2HPO4; .4320 mg/L of $ZnSO_4$-$7H_2O$; .002 mg/L of Arachidonic Acid ; 1.022 mg/L of Cholesterol; .070 mg/L of DL-alpha-Tocopherol-Acetate; 0.0520 mg/L of Linoleic Acid; 0.010 mg/L of Linolenic Acid; 0.010 mg/L of Myristic Acid; 0.010 mg/L of Oleic Acid; 0.010 mg/L of Palmitric Acid; 0.010 mg/L of Palmitic Acid; 100 mg/L of Pluronic F-68; 0.010 mg/L of Stearic Acid; 2.20 mg/L of Tween 80; 4551 mg/L of D-Glucose; 130.85 mg/ml of L- Alanine; 147.50 mg/ml of L-Arginine-HCL; 7.50 mg/ml of L-Asparagine-H_20; 6.65 mg/ml of L-Aspartic Acid; 29.56 mg/ml of L-Cystine-2HCL-H_20; 31.29 mg/ml of L-Cystine-2HCL; 7.35 mg/ml of L-Glutamic Acid; 365.0 mg/ml of L-Glutamine; 18.75 mg/ml of Glycine; 52.48 mg/ml of L-Histidine-HCL-H_20; 106.97 mg/ml of L-Isoleucine; 111.45 mg/ml of L-Leucine; 163.75 mg/ml of L-Lysine HCL; 32.34 mg/ml of L-Methionine; 68.48 mg/ml of L-Phenylalainine; 40.0 mg/ml of L-Proline; 26.25 mg/ml of L-Serine; 101.05 mg/ml of L-Threonine; 19.22 mg/ml of L-Tryptophan; 91.79 mg/ml of L-Tryrosine-2Na-$2H_20$; and 99.65 mg/ml of L-

Valine; 0.0035 mg/L of Biotin; 3.24 mg/L of D-Ca Pantothenate; 11.78 mg/L of Choline Chloride; 4.65 mg/L of Folic Acid; 15.60 mg/L of i-Inositol; 3.02 mg/L of Niacinamide; 3.00 mg/L of Pyridoxal HCL; 0.031 mg/L of Pyridoxine HCL; 0.319 mg/L of Riboflavin; 3.17 mg/L of Thiamine HCL; 0.365 mg/L of Thymidine; 0.680 mg/L of Vitamin B_{12}; 25 mM of HEPES Buffer; 2.39 mg/L of Na Hypoxanthine; 0.105 mg/L of Lipoic Acid; 0.081 mg/L of Sodium Putrescine-2HCL; 55.0 mg/L of Sodium Pyruvate; 0.0067 mg/L of Sodium Selenite; 20uM of Ethanolamine; 0.122 mg/L of Ferric Citrate; 41.70 mg/L of Methyl-B-Cyclodextrin complexed with Linoleic Acid; 33.33 mg/L of Methyl-B-Cyclodextrin complexed with Oleic Acid; 10 mg/L of Methyl-B-Cyclodextrin complexed with Retinal Acetate. Adjust osmolarity to 327 mOsm) with 2mm glutamine and 1x penstrep. (BSA (81-068-3 Bayer) 100gm dissolved in 1L DMEM for a 10% BSA stock solution). Filter the media and collect 50 ul for endotoxin assay in 15ml polystyrene conical.

The transfection reaction is terminated, preferably by tag-teaming, at the end of the incubation period. Person A aspirates off the transfection media, while person B adds 1.5ml appropriate media to each well. Incubate at 37 degree C for 45 or 72 hours depending on the media used: 1%BSA for 45 hours or CHO-5 for 72 hours.

On day four, using a 300ul multichannel pipetter, aliquot 600ul in one 1ml deep well plate and the remaining supernatant into a 2ml deep well. The supernatants from each well can then be used in the assays described in Examples 33-40.

It is specifically understood that when activity is obtained in any of the assays described below using a supernatant, the activity originates from either the polypeptide of the present invention directly (e.g., as a secreted protein) or by polypeptide of the present invention inducing expression of other proteins, which are then secreted into the supernatant. Thus, the invention further provides a method of identifying the protein in the supernatant characterized by an activity in a particular assay.

Example 32: Construction of GAS Reporter Construct

One signal transduction pathway involved in the differentiation and proliferation of cells is called the Jaks-STATs pathway. Activated proteins in the Jaks-STATs pathway bind to gamma activation site "GAS" elements or interferon-sensitive responsive element ("ISRE"), located in the promoter of many genes. The binding of a protein to these elements

alter the expression of the associated gene.

GAS and ISRE elements are recognized by a class of transcription factors called Signal Transducers and Activators of Transcription, or "STATs." There are six members of the STATs family. Stat1 and Stat3 are present in many cell types, as is Stat2 (as response to IFN-alpha is widespread). Stat4 is more restricted and is not in many cell types though it has been found in T helper class I, cells after treatment with IL-12. Stat5 was originally called mammary growth factor, but has been found at higher concentrations in other cells including myeloid cells. It can be activated in tissue culture cells by many cytokines.

The STATs are activated to translocate from the cytoplasm to the nucleus upon tyrosine phosphorylation by a set of kinases known as the Janus Kinase ("Jaks") family. Jaks represent a distinct family of soluble tyrosine kinases and include Tyk2, Jak1, Jak2, and Jak3. These kinases display significant sequence similarity and are generally catalytically inactive in resting cells.

The Jaks are activated by a wide range of receptors summarized in the Table below. (Adapted from review by Schidler and Darnell, Ann. Rev. Biochem. 64:621-51 (1995).) A cytokine receptor family, capable of activating Jaks, is divided into two groups: (a) Class 1 includes receptors for IL-2, IL-3, IL-4, IL-6, IL-7, IL-9, IL-11, IL-12, IL-15, Epo, PRL, GH, G-CSF, GM-CSF, LIF, CNTF, and thrombopoietin; and (b) Class 2 includes IFN-a, IFN-g, and IL-10. The Class 1 receptors share a conserved cysteine motif (a set of four conserved cysteines and one tryptophan) and a WSXWS motif (a membrane proximal region encoding Trp-Ser-Xxx-Trp-Ser (SEQ ID NO:838)).

Thus, on binding of a ligand to a receptor, Jaks are activated, which in turn activate STATs, which then translocate and bind to GAS elements. This entire process is encompassed in the Jaks-STATs signal transduction pathway.

Therefore, activation of the Jaks-STATs pathway, reflected by the binding of the GAS or the ISRE element, can be used to indicate proteins involved in the proliferation and differentiation of cells. For example, growth factors and cytokines are known to activate the Jaks-STATs pathway. (See Table below.) Thus, by using GAS elements linked to reporter molecules, activators of the Jaks-STATs pathway can be identified.

	JAKs				STATS	GAS(elements) or ISRE
Ligand	tyk2	Jak1	Jak2	Jak3		
IFN family						
IFN-a/B	+	+	-	-	1,2,3	ISRE
IFN-g		+	+	-	1	GAS (IRF1>Lys6>IFP)
Il-10	+	?	?	-	1,3	
gp130 family						
IL-6 (Pleiotrohic)	+	+	+	?	1,3	GAS (IRF1>Lys6>IFP)
Il-11(Pleiotrohic)	?	+	?	?	1,3	
OnM(Pleiotrohic)	?	+	+	?	1,3	
LIF(Pleiotrohic)	?	+	+	?	1,3	
CNTF(Pleiotrohic)	-/+	+	+	?	1,3	
G-CSF(Pleiotrohic)	?	+	?	?	1,3	
IL-12(Pleiotrohic)	+	-	+	+	1,3	
g-C family						
IL-2 (lymphocytes)	-	+	-	+	1,3,5	GAS
IL-4 (lymph/myeloid)	-	+	-	+	6	GAS (IRF1 = IFP >>Ly6)(IgH)
IL-7 (lymphocytes)	-	+	-	+	5	GAS
IL-9 (lymphocytes)	-	+	-	+	5	GAS
IL-13 (lymphocyte)	-	+	?	?	6	GAS
IL-15	?	+	?	+	5	GAS
gp140 family						
IL-3 (myeloid)	-	-	+	-	5	GAS (IRF1>IFP>>Ly6)
IL-5 (myeloid)	-	-	+	-	5	GAS
GM-CSF (myeloid)	-	-	+	-	5	GAS
Growth hormone family						
GH	?	-	+	-	5	
PRL	?	+/-	+	-	1,3,5	
EPO	?	-	+	-	5	GAS(B-

CAS>IRF1=IFP>>Ly6)

Receptor Tyrosine Kinases						
EGF	?	+	+	-	1,3	GAS (IRF1)
PDGF	?	+	+	-	1,3	
CSF-1	?	+	+	-	1,3	GAS (not IRF1)

To construct a synthetic GAS containing promoter element, which is used in the Biological Assays described in Examples 33-34, a PCR based strategy is employed to generate a GAS-SV40 promoter sequence. The 5' primer contains four tandem copies of the GAS binding site found in the IRF1 promoter and previously demonstrated to bind STATs upon induction with a range of cytokines (Rothman et al., Immunity 1:457-468 (1994).), although other GAS or ISRE elements can be used instead. The 5' primer also contains 18bp of sequence complementary to the SV40 early promoter sequence and is flanked with an XhoI site. The sequence of the 5' primer is:

5':GCGCCTCGAGATTTCCCCGAAATCTAGATTTCCCCGAAATGATTTCCCC GAAATGATTTCCCCGAAATATCTGCCATCTCAATTAG:3' (SEQ ID NO:839)

The downstream primer is complementary to the SV40 promoter and is flanked with a Hind III site: 5`:GCGGCAAGCTTTTTGCAAAGCCTAGGC:3' (SEQ ID NO:840)

PCR amplification is performed using the SV40 promoter template present in the B-gal:promoter plasmid obtained from Clontech. The resulting PCR fragment is digested with XhoI/Hind III and subcloned into BLSK2-. (Stratagene.) Sequencing with forward and reverse primers confirms that the insert contains the following sequence:

5':CTCGAGATTTCCCCGAAATCTAGATTTCCCCGAAATGATTTCCCCGAAA TGATTTCCCCGAAATATCTGCCATCTCAATTAGTCAGCAACCATAGTCCCG CCCCTAACTCCGCCCATCCCGCCCCTAACTCCGCCCAGTTCCGCCCATTCT CCGCCCCATGGCTGACTAATTTTTTTTATTTATGCAGAGGCCGAGGCCGCC TCGGCCTCTGAGCTATTCCAGAAGTAGTGAGGAGGCTTTTTTGGAGGCCTA GGCTTTTGCAAAAAGCTT:3' (SEQ ID NO:841)

With this GAS promoter element linked to the SV40 promoter, a GAS:SEAP2 reporter construct is next engineered. Here, the reporter molecule is a secreted alkaline phosphatase, or "SEAP." Clearly, however, any reporter molecule can be instead of SEAP, in this or in any of the other Examples. Well known reporter molecules that can be used instead of SEAP include chloramphenicol

acetyltransferase (CAT), luciferase, alkaline phosphatase, B-galactosidase, green fluorescent protein (GFP), or any protein detectable by an antibody.

The above sequence confirmed synthetic GAS-SV40 promoter element is subcloned into the pSEAP-Promoter vector obtained from Clontech using HindIII and XhoI, effectively replacing the SV40 promoter with the amplified GAS:SV40 promoter element, to create the GAS-SEAP vector. However, this vector does not contain a neomycin resistance gene, and therefore, is not preferred for mammalian expression systems.

Thus, in order to generate mammalian stable cell lines expressing the GAS-SEAP reporter, the GAS-SEAP cassette is removed from the GAS-SEAP vector using SalI and NotI, and inserted into a backbone vector containing the neomycin resistance gene, such as pGFP-1 (Clontech), using these restriction sites in the multiple cloning site, to create the GAS-SEAP/Neo vector. Once this vector is transfected into mammalian cells, this vector can then be used as a reporter molecule for GAS binding as described in Examples 33-34.

Other constructs can be made using the above description and replacing GAS with a different promoter sequence. For example, construction of reporter molecules containing NFK-B and EGR promoter sequences are described in Examples 35 and 36. However, many other promoters can be substituted using the protocols described in these Examples. For instance, SRE, IL-2, NFAT, or Osteocalcin promoters can be substituted, alone or in combination (e.g., GAS/NF-KB/EGR, GAS/NF-KB, Il-2/NFAT, or NF-KB/GAS). Similarly, other cell lines can be used to test reporter construct activity, such as HELA (epithelial), HUVEC (endothelial), Reh (B-cell), Saos-2 (osteoblast), HUVAC (aortic), or Cardiomyocyte.

Example 33: High-Throughput Screening Assay for T-cell Activity.

The following protocol is used to assess T-cell activity by identifying factors, and determining whether supernate containing a polypeptide of the invention proliferates and/or differentiates T-cells. T-cell activity is assessed using the

GAS/SEAP/Neo construct produced in Example 32. Thus, factors that increase SEAP activity indicate the ability to activate the Jaks-STATS signal transduction pathway. The T-cell used in this assay is Jurkat T-cells (ATCC Accession No. TIB-152), although Molt-3 cells (ATCC Accession No. CRL-1552) and Molt-4 cells (ATCC Accession No. CRL-1582) cells can also be used.

Jurkat T-cells are lymphoblastic CD4+ Th1 helper cells. In order to generate stable cell lines, approximately 2 million Jurkat cells are transfected with the GAS-SEAP/neo vector using DMRIE-C (Life Technologies)(transfection procedure described below). The transfected cells are seeded to a density of approximately 20,000 cells per well and transfectants resistant to 1 mg/ml genticin selected. Resistant colonies are expanded and then tested for their response to increasing concentrations of interferon gamma. The dose response of a selected clone is demonstrated.

Specifically, the following protocol will yield sufficient cells for 75 wells containing 200 ul of cells. Thus, it is either scaled up, or performed in multiple to generate sufficient cells for multiple 96 well plates. Jurkat cells are maintained in RPMI + 10% serum with 1%Pen-Strep. Combine 2.5 mls of OPTI-MEM (Life Technologies) with 10 ug of plasmid DNA in a T25 flask. Add 2.5 ml OPTI-MEM containing 50 ul of DMRIE-C and incubate at room temperature for 15-45 mins.

During the incubation period, count cell concentration, spin down the required number of cells (10^7 per transfection), and resuspend in OPTI-MEM to a final concentration of 10^7 cells/ml. Then add 1ml of 1 x 10^7 cells in OPTI-MEM to T25 flask and incubate at 37 degree C for 6 hrs. After the incubation, add 10 ml of RPMI + 15% serum.

The Jurkat:GAS-SEAP stable reporter lines are maintained in RPMI + 10% serum, 1 mg/ml Genticin, and 1% Pen-Strep. These cells are treated with supernatants containing polypeptide of the present invention or polypeptide of the present invention induced polypeptides as produced by the protocol described in Example 31.

On the day of treatment with the supernatant, the cells should be washed and

resuspended in fresh RPMI + 10% serum to a density of 500,000 cells per ml. The exact number of cells required will depend on the number of supernatants being screened. For one 96 well plate, approximately 10 million cells (for 10 plates, 100 million cells) are required.

Transfer the cells to a triangular reservoir boat, in order to dispense the cells into a 96 well dish, using a 12 channel pipette. Using a 12 channel pipette, transfer 200 ul of cells into each well (therefore adding 100, 000 cells per well).

After all the plates have been seeded, 50 ul of the supernatants are transferred directly from the 96 well plate containing the supernatants into each well using a 12 channel pipette. In addition, a dose of exogenous interferon gamma (0.1, 1.0, 10 ng) is added to wells H9, H10, and H11 to serve as additional positive controls for the assay.

The 96 well dishes containing Jurkat cells treated with supernatants are placed in an incubator for 48 hrs (note: this time is variable between 48-72 hrs). 35 ul samples from each well are then transferred to an opaque 96 well plate using a 12 channel pipette. The opaque plates should be covered (using sellophene covers) and stored at -20 degree C until SEAP assays are performed according to Example 37. The plates containing the remaining treated cells are placed at 4 degree C and serve as a source of material for repeating the assay on a specific well if desired.

As a positive control, 100 Unit/ml interferon gamma can be used which is known to activate Jurkat T cells. Over 30 fold induction is typically observed in the positive control wells.

The above protocol may be used in the generation of both transient, as well as, stable transfected cells, which would be apparent to those of skill in the art.

Example 34: High-Throughput Screening Assay Identifying Myeloid Activity

The following protocol is used to assess myeloid activity of polypeptide of the present invention by determining whether polypeptide of the present invention proliferates and/or differentiates myeloid cells. Myeloid cell activity is assessed using

the GAS/SEAP/Neo construct produced in Example 32. Thus, factors that increase SEAP activity indicate the ability to activate the Jaks-STATS signal transduction pathway. The myeloid cell used in this assay is U937, a pre-monocyte cell line, although TF-1, HL60, or KG1 can be used.

To transiently transfect U937 cells with the GAS/SEAP/Neo construct produced in Example 32, a DEAE-Dextran method (Kharbanda et. al., 1994, Cell Growth & Differentiation, 5:259-265) is used. First, harvest $2x10e^7$ U937 cells and wash with PBS. The U937 cells are usually grown in RPMI 1640 medium containing 10% heat-inactivated fetal bovine serum (FBS) supplemented with 100 units/ml penicillin and 100 mg/ml streptomycin.

Next, suspend the cells in 1 ml of 20 mM Tris-HCl (pH 7.4) buffer containing 0.5 mg/ml DEAE-Dextran, 8 ug GAS-SEAP2 plasmid DNA, 140 mM NaCl, 5 mM KCl, 375 uM $Na_2HPO_4.7H_2O$, 1 mM $MgCl_2$, and 675 uM $CaCl_2$. Incubate at 37 degrees C for 45 min.

Wash the cells with RPMI 1640 medium containing 10% FBS and then resuspend in 10 ml complete medium and incubate at 37 degree C for 36 hr.

The GAS-SEAP/U937 stable cells are obtained by growing the cells in 400 ug/ml G418. The G418-free medium is used for routine growth but every one to two months, the cells should be re-grown in 400 ug/ml G418 for couple of passages.

These cells are tested by harvesting $1x10^8$ cells (this is enough for ten 96-well plates assay) and wash with PBS. Suspend the cells in 200 ml above described growth medium, with a final density of $5x10^5$ cells/ml. Plate 200 ul cells per well in the 96-well plate (or $1x10^5$ cells/well).

Add 50 ul of the supernatant prepared by the protocol described in Example 31. Incubate at 37 degee C for 48 to 72 hr. As a positive control, 100 Unit/ml interferon gamma can be used which is known to activate U937 cells. Over 30 fold induction is typically observed in the positive control wells. SEAP assay the supernatant according to the protocol described in Example 37.

Example 35: High-Throughput Screening Assay Identifying Neuronal Activity.

When cells undergo differentiation and proliferation, a group of genes are activated through many different signal transduction pathways. One of these genes, EGR1 (early growth response gene 1), is induced in various tissues and cell types upon activation. The promoter of EGR1 is responsible for such induction. Using the EGR1 promoter linked to reporter molecules, activation of cells can be assessed by polypeptide of the present invention.

Particularly, the following protocol is used to assess neuronal activity in PC12 cell lines. PC12 cells (rat phenochromocytoma cells) are known to proliferate and/or differentiate by activation with a number of mitogens, such as TPA (tetradecanoyl phorbol acetate), NGF (nerve growth factor), and EGF (epidermal growth factor). The EGR1 gene expression is activated during this treatment. Thus, by stably transfecting PC12 cells with a construct containing an EGR promoter linked to SEAP reporter, activation of PC12 cells by polypeptide of the present invention can be assessed.

The EGR/SEAP reporter construct can be assembled by the following protocol. The EGR-1 promoter sequence (-633 to +1)(Sakamoto K et al., Oncogene 6:867-871 (1991)) can be PCR amplified from human genomic DNA using the following primers:

5' GCGCTCGAGGGATGACAGCGATAGAACCCCGG -3' (SEQ ID NO:842)

5' GCGAAGCTTCGCGACTCCCCGGATCCGCCTC-3' (SEQ ID NO:843)

Using the GAS:SEAP/Neo vector produced in Example 32, EGR1 amplified product can then be inserted into this vector. Linearize the GAS:SEAP/Neo vector using restriction enzymes XhoI/HindIII, removing the GAS/SV40 stuffer. Restrict the EGR1 amplified product with these same enzymes. Ligate the vector and the EGR1 promoter.

To prepare 96 well-plates for cell culture, two mls of a coating solution (1:30 dilution of collagen type I (Upstate Biotech Inc. Cat#08-115) in 30% ethanol (filter sterilized)) is added per one 10 cm plate or 50 ml per well of the 96-well plate, and

allowed to air dry for 2 hr.

PC12 cells are routinely grown in RPMI-1640 medium (Bio Whittaker) containing 10% horse serum (JRH BIOSCIENCES, Cat. # 12449-78P), 5% heat-inactivated fetal bovine serum (FBS) supplemented with 100 units/ml penicillin and 100 ug/ml streptomycin on a precoated 10 cm tissue culture dish. One to four split is done every three to four days. Cells are removed from the plates by scraping and resuspended with pipetting up and down for more than 15 times.

Transfect the EGR/SEAP/Neo construct into PC12 using the Lipofectamine protocol described in Example 31. EGR-SEAP/PC12 stable cells are obtained by growing the cells in 300 ug/ml G418. The G418-free medium is used for routine growth but every one to two months, the cells should be re-grown in 300 ug/ml G418 for couple of passages.

To assay for neuronal activity, a 10 cm plate with cells around 70 to 80% confluent is screened by removing the old medium. Wash the cells once with PBS (Phosphate buffered saline). Then starve the cells in low serum medium (RPMI-1640 containing 1% horse serum and 0.5% FBS with antibiotics) overnight.

The next morning, remove the medium and wash the cells with PBS. Scrape off the cells from the plate, suspend the cells well in 2 ml low serum medium. Count the cell number and add more low serum medium to reach final cell density as $5x10^5$ cells/ml.

Add 200 ul of the cell suspension to each well of 96-well plate (equivalent to $1x10^5$ cells/well). Add 50 ul supernatant produced by Example 31, 37 degree C for 48 to 72 hr. As a positive control, a growth factor known to activate PC12 cells through EGR can be used, such as 50 ng/ul of Neuronal Growth Factor (NGF). Over fifty-fold induction of SEAP is typically seen in the positive control wells. SEAP assay the supernatant according to Example 37.

Example 36: High-Throughput Screening Assay for T-cell Activity

NF-KB (Nuclear Factor KB) is a transcription factor activated by a wide

variety of agents including the inflammatory cytokines IL-1 and TNF, CD30 and CD40, lymphotoxin-alpha and lymphotoxin-beta, by exposure to LPS or thrombin, and by expression of certain viral gene products. As a transcription factor, NF-KB regulates the expression of genes involved in immune cell activation, control of apoptosis (NF- KB appears to shield cells from apoptosis), B and T-cell development, anti-viral and antimicrobial responses, and multiple stress responses.

In non-stimulated conditions, NF- KB is retained in the cytoplasm with I-KB (Inhibitor KB). However, upon stimulation, I- KB is phosphorylated and degraded, causing NF- KB to shuttle to the nucleus, thereby activating transcription of target genes. Target genes activated by NF- KB include IL-2, IL-6, GM-CSF, ICAM-1 and class 1 MHC.

Due to its central role and ability to respond to a range of stimuli, reporter constructs utilizing the NF-KB promoter element are used to screen the supernatants produced in Example 31. Activators or inhibitors of NF-KB would be useful in treating, preventing, and/or diagnosing diseases. For example, inhibitors of NF-KB could be used to treat those diseases related to the acute or chronic activation of NF-KB, such as rheumatoid arthritis.

To construct a vector containing the NF-KB promoter element, a PCR based strategy is employed. The upstream primer contains four tandem copies of the NF-KB binding site (GGGGACTTTCCC) (SEQ ID NO:844), 18 bp of sequence complementary to the 5' end of the SV40 early promoter sequence, and is flanked with an XhoI site:

5':GCGGCCTCGAGGGGACTTTCCCGGGGACTTTCCGGGGACTTTCCGGGAC TTTCCATCCTGCCATCTCAATTAG:3' (SEQ ID NO:845)

The downstream primer is complementary to the 3' end of the SV40 promoter and is flanked with a Hind III site:

5':GCGGCAAGCTTTTTGCAAAGCCTAGGC:3' (SEQ ID NO:840)

PCR amplification is performed using the SV40 promoter template present in the pB-gal:promoter plasmid obtained from Clontech. The resulting PCR fragment is digested with XhoI and Hind III and subcloned into BLSK2-. (Stratagene)

Sequencing with the T7 and T3 primers confirms the insert contains the following sequence:

5':CTCGAGGGGACTTTCCCGGGGACTTTCCGGGGACTTTCCGGGACTTTCC
ATCTGCCATCTCAATTAGTCAGCAACCATAGTCCCGCCCCTAACTCCGCCC
ATCCCGCCCCTAACTCCGCCCAGTTCCGCCCATTCTCCGCCCCATGGCTGA
CTAATTTTTTTTATTTATGCAGAGGCCGAGGCCGCCTCGGCCTCTGAGCTA
TTCCAGAAGTAGTGAGGAGGCTTTTTTGGAGGCCTAGGCTTTTGCAAAAA
GCTT:3' (SEQ ID NO:846)

Next, replace the SV40 minimal promoter element present in the pSEAP2-promoter plasmid (Clontech) with this NF-KB/SV40 fragment using XhoI and HindIII. However, this vector does not contain a neomycin resistance gene, and therefore, is not preferred for mammalian expression systems.

In order to generate stable mammalian cell lines, the NF-KB/SV40/SEAP cassette is removed from the above NF-KB/SEAP vector using restriction enzymes SalI and NotI, and inserted into a vector containing neomycin resistance. Particularly, the NF-KB/SV40/SEAP cassette was inserted into pGFP-1 (Clontech), replacing the GFP gene, after restricting pGFP-1 with SalI and NotI.

Once NF-KB/SV40/SEAP/Neo vector is created, stable Jurkat T-cells are created and maintained according to the protocol described in Example 33. Similarly, the method for assaying supernatants with these stable Jurkat T-cells is also described in Example 33. As a positive control, exogenous TNF alpha (0.1,1, 10 ng) is added to wells H9, H10, and H11, with a 5-10 fold activation typically observed.

Example 37: Assay for SEAP Activity

As a reporter molecule for the assays described in Examples 33-36, SEAP activity is assayed using the Tropix Phospho-light Kit (Cat. BP-400) according to the following general procedure. The Tropix Phospho-light Kit supplies the Dilution, Assay, and Reaction Buffers used below.

Prime a dispenser with the 2.5x Dilution Buffer and dispense 15 ul of 2.5x

dilution buffer into Optiplates containing 35 ul of a supernatant. Seal the plates with a plastic sealer and incubate at 65 degree C for 30 min. Separate the Optiplates to avoid uneven heating.

Cool the samples to room temperature for 15 minutes. Empty the dispenser and prime with the Assay Buffer. Add 50 ml Assay Buffer and incubate at room temperature 5 min. Empty the dispenser and prime with the Reaction Buffer (see the table below). Add 50 ul Reaction Buffer and incubate at room temperature for 20 minutes. Since the intensity of the chemiluminescent signal is time dependent, and it takes about 10 minutes to read 5 plates on luminometer, one should treat 5 plates at each time and start the second set 10 minutes later.

Read the relative light unit in the luminometer. Set H12 as blank, and print the results. An increase in chemiluminescence indicates reporter activity.

Reaction Buffer Formulation:

# of plates	Rxn buffer diluent (ml)	CSPD (ml)
10	60	3
11	65	3.25
12	70	3.5
13	75	3.75
14	80	4
15	85	4.25
16	90	4.5
17	95	4.75
18	100	5
19	105	5.25
20	110	5.5
21	115	5.75
22	120	6
23	125	6.25

24	130	6.5
25	135	6.75
26	140	7
27	145	7.25
28	150	7.5
29	155	7.75
30	160	8
31	165	8.25
32	170	8.5
33	175	8.75
34	180	9
35	185	9.25
36	190	9.5
37	195	9.75
38	200	10
39	205	10.25
40	210	10.5
41	215	10.75
42	220	11
43	225	11.25
44	230	11.5
45	235	11.75
46	240	12
47	245	12.25
48	250	12.5
49	255	12.75
50	260	13

Example 38: High-Throughput Screening Assay Identifying Changes in Small Molecule Concentration and Membrane Permeability

Binding of a ligand to a receptor is known to alter intracellular levels of small molecules, such as calcium, potassium, sodium, and pH, as well as alter membrane potential. These alterations can be measured in an assay to identify supernatants which bind to receptors of a particular cell. Although the following protocol describes an assay for calcium, this protocol can easily be modified to detect changes in potassium, sodium, pH, membrane potential, or any other small molecule which is detectable by a fluorescent probe.

The following assay uses Fluorometric Imaging Plate Reader ("FLIPR") to measure changes in fluorescent molecules (Molecular Probes) that bind small molecules. Clearly, any fluorescent molecule detecting a small molecule can be used instead of the calcium fluorescent molecule, fluo-4 (Molecular Probes, Inc.; catalog no. F-14202), used here.

For adherent cells, seed the cells at 10,000 -20,000 cells/well in a Co-star black 96-well plate with clear bottom. The plate is incubated in a CO_2 incubator for 20 hours. The adherent cells are washed two times in Biotek washer with 200 ul of HBSS (Hank's Balanced Salt Solution) leaving 100 ul of buffer after the final wash.

A stock solution of 1 mg/ml fluo-4 is made in 10% pluronic acid DMSO. To load the cells with fluo-4 , 50 ul of 12 ug/ml fluo-4 is added to each well. The plate is incubated at 37 degrees C in a CO_2 incubator for 60 min. The plate is washed four times in the Biotek washer with HBSS leaving 100 ul of buffer.

For non-adherent cells, the cells are spun down from culture media. Cells are re-suspended to $2\text{-}5x10^6$ cells/ml with HBSS in a 50-ml conical tube. 4 ul of 1 mg/ml fluo-4 solution in 10% pluronic acid DMSO is added to each ml of cell suspension. The tube is then placed in a 37 degrees C water bath for 30-60 min. The cells are washed twice with HBSS, resuspended to $1x10^6$ cells/ml, and dispensed into a microplate, 100 ul/well. The plate is centrifuged at 1000 rpm for 5 min. The plate is then washed once in Denley Cell Wash with 200 ul, followed by an aspiration step to 100 ul final volume.

For a non-cell based assay, each well contains a fluorescent molecule, such as

fluo-4 . The supernatant is added to the well, and a change in fluorescence is detected.

To measure the fluorescence of intracellular calcium, the FLIPR is set for the following parameters: (1) System gain is 300-800 mW; (2) Exposure time is 0.4 second; (3) Camera F/stop is F/2; (4) Excitation is 488 nm; (5) Emission is 530 nm; and (6) Sample addition is 50 ul. Increased emission at 530 nm indicates an extracellular signaling event caused by the a molecule, either polypeptide of the present invention or a molecule induced by polypeptide of the present invention, which has resulted in an increase in the intracellular Ca^{++} concentration.

Example 40: High-Throughput Screening Assay Identifying Tyrosine Kinase Activity

The Protein Tyrosine Kinases (PTK) represent a diverse group of transmembrane and cytoplasmic kinases. Within the Receptor Protein Tyrosine Kinase RPTK) group are receptors for a range of mitogenic and metabolic growth factors including the PDGF, FGF, EGF, NGF, HGF and Insulin receptor subfamilies. In addition there are a large family of RPTKs for which the corresponding ligand is unknown. Ligands for RPTKs include mainly secreted small proteins, but also membrane-bound and extracellular matrix proteins.

Activation of RPTK by ligands involves ligand-mediated receptor dimerization, resulting in transphosphorylation of the receptor subunits and activation of the cytoplasmic tyrosine kinases. The cytoplasmic tyrosine kinases include receptor associated tyrosine kinases of the src-family (e.g., src, yes, lck, lyn, fyn) and non-receptor linked and cytosolic protein tyrosine kinases, such as the Jak family, members of which mediate signal transduction triggered by the cytokine superfamily of receptors (e.g., the Interleukins, Interferons, GM-CSF, and Leptin).

Because of the wide range of known factors capable of stimulating tyrosine kinase activity, identifying whether polypeptide of the present invention or a molecule induced by polypeptide of the present invention is capable of activating tyrosine kinase signal transduction pathways is of interest. Therefore, the following protocol

is designed to identify such molecules capable of activating the tyrosine kinase signal transduction pathways.

Seed target cells (e.g., primary keratinocytes) at a density of approximately 25,000 cells per well in a 96 well Loprodyne Silent Screen Plates purchased from Nalge Nunc (Naperville, IL). The plates are sterilized with two 30 minute rinses with 100% ethanol, rinsed with water and dried overnight. Some plates are coated for 2 hr with 100 ml of cell culture grade type I collagen (50 mg/ml), gelatin (2%) or polylysine (50 mg/ml), all of which can be purchased from Sigma Chemicals (St. Louis, MO) or 10% Matrigel purchased from Becton Dickinson (Bedford,MA), or calf serum, rinsed with PBS and stored at 4 degree C. Cell growth on these plates is assayed by seeding 5,000 cells/well in growth medium and indirect quantitation of cell number through use of alamarBlue as described by the manufacturer Alamar Biosciences, Inc. (Sacramento, CA) after 48 hr. Falcon plate covers #3071 from Becton Dickinson (Bedford,MA) are used to cover the Loprodyne Silent Screen Plates. Falcon Microtest III cell culture plates can also be used in some proliferation experiments.

To prepare extracts, A431 cells are seeded onto the nylon membranes of Loprodyne plates (20,000/200ml/well) and cultured overnight in complete medium. Cells are quiesced by incubation in serum-free basal medium for 24 hr. After 5-20 minutes treatment with EGF (60ng/ml) or 50 ul of the supernatant produced in Example 31, the medium was removed and 100 ml of extraction buffer ((20 mM HEPES pH 7.5, 0.15 M NaCl, 1% Triton X-100, 0.1% SDS, 2 mM Na3VO4, 2 mM Na4P2O7 and a cocktail of protease inhibitors (# 1836170) obtained from Boeheringer Mannheim (Indianapolis, IN) is added to each well and the plate is shaken on a rotating shaker for 5 minutes at 4^{o}C. The plate is then placed in a vacuum transfer manifold and the extract filtered through the 0.45 mm membrane bottoms of each well using house vacuum. Extracts are collected in a 96-well catch/assay plate in the bottom of the vacuum manifold and immediately placed on ice. To obtain extracts clarified by centrifugation, the content of each well, after detergent solubilization for 5 minutes, is removed and centrifuged for 15 minutes at 4

degree C at 16,000 x g.

Test the filtered extracts for levels of tyrosine kinase activity. Although many methods of detecting tyrosine kinase activity are known, one method is described here.

Generally, the tyrosine kinase activity of a supernatant is evaluated by determining its ability to phosphorylate a tyrosine residue on a specific substrate (a biotinylated peptide). Biotinylated peptides that can be used for this purpose include PSK1 (corresponding to amino acids 6-20 of the cell division kinase cdc2-p34) and PSK2 (corresponding to amino acids 1-17 of gastrin). Both peptides are substrates for a range of tyrosine kinases and are available from Boehringer Mannheim.

The tyrosine kinase reaction is set up by adding the following components in order. First, add 10ul of 5uM Biotinylated Peptide, then 10ul ATP/Mg_{2+} (5mM ATP/50mM $MgCl_2$), then 10ul of 5x Assay Buffer (40mM imidazole hydrochloride, pH7.3, 40 mM beta-glycerophosphate, 1mM EGTA, 100mM $MgCl_2$, 5 mM $MnCl_2$, 0.5 mg/ml BSA), then 5ul of Sodium Vanadate(1mM), and then 5ul of water. Mix the components gently and preincubate the reaction mix at 30 degree C for 2 min. Initial the reaction by adding 10ul of the control enzyme or the filtered supernatant.

The tyrosine kinase assay reaction is then terminated by adding 10 ul of 120mm EDTA and place the reactions on ice.

Tyrosine kinase activity is determined by transferring 50 ul aliquot of reaction mixture to a microtiter plate (MTP) module and incubating at 37 degree C for 20 min. This allows the streptavadin coated 96 well plate to associate with the biotinylated peptide. Wash the MTP module with 300ul/well of PBS four times. Next add 75 ul of anti-phospotyrosine antibody conjugated to horse radish peroxidase(anti-P-Tyr-POD(0.5u/ml)) to each well and incubate at 37 degree C for one hour. Wash the well as above.

Next add 100ul of peroxidase substrate solution (Boehringer Mannheim) and incubate at room temperature for at least 5 mins (up to 30 min). Measure the absorbance of the sample at 405 nm by using ELISA reader. The level of bound peroxidase activity is quantitated using an ELISA reader and reflects the level of

tyrosine kinase activity.

Example 41: High-Throughput Screening Assay Identifying Phosphorylation Activity

As a potential alternative and/or compliment to the assay of protein tyrosine kinase activity described in Example 40, an assay which detects activation (phosphorylation) of major intracellular signal transduction intermediates can also be used. For example, as described below one particular assay can detect tyrosine phosphorylation of the Erk-1 and Erk-2 kinases. However, phosphorylation of other molecules, such as Raf, JNK, p38 MAP, Map kinase kinase (MEK), MEK kinase, Src, Muscle specific kinase (MuSK), IRAK, Tec, and Janus, as well as any other phosphoserine, phosphotyrosine, or phosphothreonine molecule, can be detected by substituting these molecules for Erk-1 or Erk-2 in the following assay.

Specifically, assay plates are made by coating the wells of a 96-well ELISA plate with 0.1ml of protein G (1ug/ml) for 2 hr at room temp, (RT). The plates are then rinsed with PBS and blocked with 3% BSA/PBS for 1 hr at RT. The protein G plates are then treated with 2 commercial monoclonal antibodies (100ng/well) against Erk-1 and Erk-2 (1 hr at RT) (Santa Cruz Biotechnology). (To detect other molecules, this step can easily be modified by substituting a monoclonal antibody detecting any of the above described molecules.) After 3-5 rinses with PBS, the plates are stored at 4 degree C until use.

A431 cells are seeded at 20,000/well in a 96-well Loprodyne filterplate and cultured overnight in growth medium. The cells are then starved for 48 hr in basal medium (DMEM) and then treated with EGF (6ng/well) or 50 ul of the supernatants obtained in Example 31 for 5-20 minutes. The cells are then solubilized and extracts filtered directly into the assay plate.

After incubation with the extract for 1 hr at RT, the wells are again rinsed. As a positive control, a commercial preparation of MAP kinase (10ng/well) is used in place of A431 extract. Plates are then treated with a commercial polyclonal (rabbit) antibody (1ug/ml) which specifically recognizes the phosphorylated epitope of the

Erk-1 and Erk-2 kinases (1 hr at RT). This antibody is biotinylated by standard procedures. The bound polyclonal antibody is then quantitated by successive incubations with Europium-streptavidin and Europium fluorescence enhancing reagent in the Wallac DELFIA instrument (time-resolved fluorescence). An increased fluorescent signal over background indicates a phosphorylation by polypeptide of the present invention or a molecule induced by polypeptide of the present invention.

Example 42: Assay for the Stimulation of Bone Marrow CD34+ Cell Proliferation

This assay is based on the ability of human CD34+ to proliferate in the presence of hematopoietic growth factors and evaluates the ability of isolated polypeptides expressed in mammalian cells to stimulate proliferation of CD34+ cells.

It has been previously shown that most mature precursors will respond to only a single signal. More immature precursors require at least two signals to respond. Therefore, to test the effect of polypeptides on hematopoietic activity of a wide range of progenitor cells, the assay contains a given polypeptide in the presence or absence of other hematopoietic growth factors. Isolated cells are cultured for 5 days in the presence of Stem Cell Factor (SCF) in combination with tested sample. SCF alone has a very limited effect on the proliferation of bone marrow (BM) cells, acting in such conditions only as a "survival" factor. However, combined with any factor exhibiting stimulatory effect on these cells (e.g., IL-3), SCF will cause a synergistic effect. Therefore, if the tested polypeptide has a stimulatory effect on a hematopoietic progenitors, such activity can be easily detected. Since normal BM cells have a low level of cycling cells, it is likely that any inhibitory effect of a given polypeptide, or agonists or antagonists thereof, might not be detected. Accordingly, assays for an inhibitory effect on progenitors is preferably tested in cells that are first subjected to *in vitro* stimulation with SCF+IL+3, and then contacted with the compound that is being evaluated for inhibition of such induced proliferation.

Briefly, CD34+ cells are isolated using methods known in the art. The cells are thawed and resuspended in medium (QBSF 60 serum-free medium with 1% L-

glutamine (500ml) Quality Biological, Inc., Gaithersburg, MD Cat# 160-204-101). After several gentle centrifugation steps at 200 x g, cells are allowed to rest for one hour. The cell count is adjusted to 2.5 x 10^5 cells/ml. During this time, 100 µl of sterile water is added to the peripheral wells of a 96-well plate. The cytokines that can be tested with a given polypeptide in this assay is rhSCF (R&D Systems, Minneapolis, MN, Cat# 255-SC) at 50 ng/ml alone and in combination with rhSCF and rhIL-3 (R&D Systems, Minneapolis, MN, Cat# 203-ML) at 30 ng/ml. After one hour, 10 µl of prepared cytokines, 50 µl of the supernatants prepared in Example 31 (supernatants at 1:2 dilution = 50 µl) and 20 µl of diluted cells are added to the media which is already present in the wells to allow for a final total volume of 100 µl. The plates are then placed in a 37°C/5% CO_2 incubator for five days.

Eighteen hours before the assay is harvested, 0.5 µCi/well of [3H] Thymidine is added in a 10 µl volume to each well to determine the proliferation rate. The experiment is terminated by harvesting the cells from each 96-well plate to a filtermat using the Tomtec Harvester 96. After harvesting, the filtermats are dried, trimmed and placed into OmniFilter assemblies consisting of one OmniFilter plate and one OmniFilter Tray. 60 µl Microscint is added to each well and the plate sealed with TopSeal-A press-on sealing film A bar code 15 sticker is affixed to the first plate for counting. The sealed plates is then loaded and the level of radioactivity determined via the Packard Top Count and the printed data collected for analysis. The level of radioactivity reflects the amount of cell proliferation.

The studies described in this example test the activity of a given polypeptide to stimulate bone marrow CD34+ cell proliferation. One skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides (e.g., gene therapy), antibodies, agonists, and/or antagonists and fragments and variants thereof. As a nonlimiting example, potential antagonists tested in this assay would be expected to inhibit cell proliferation in the presence of cytokines and/or to increase the inhibition of cell proliferation in the presence of cytokines and a given polypeptide. In contrast, potential agonists tested in this assay would be expected to enhance cell proliferation and/or to decrease the inhibition of cell proliferation in the presence of

cytokines and a given polypeptide.

The ability of a gene to stimulate the proliferation of bone marrow CD34+ cells indicates that polynucleotides and polypeptides corresponding to the gene are useful for the diagnosis and treatment of disorders affecting the immune system and hematopoiesis. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections above, and elsewhere herein.

Example 43: Assay for Extracellular Matrix Enhanced Cell Response (EMECR)

The objective of the Extracellular Matrix Enhanced Cell Response (EMECR) assay is to identify gene products (e.g., isolated polypeptides) that act on the hematopoietic stem cells in the context of the extracellular matrix (ECM) induced signal.

Cells respond to the regulatory factors in the context of signal(s) received from the surrounding microenvironment. For example, fibroblasts, and endothelial and epithelial stem cells fail to replicate in the absence of signals from the ECM. Hematopoietic stem cells can undergo self-renewal in the bone marrow, but not in *in vitro* suspension culture. The ability of stem cells to undergo self-renewal *in vitro* is dependent upon their interaction with the stromal cells and the ECM protein fibronectin (fn). Adhesion of cells to fn is mediated by the $\alpha_5.\beta_1$ and $\alpha_4.\beta_1$ integrin receptors, which are expressed by human and mouse hematopoietic stem cells. The factor(s) which integrate with the ECM environment and responsible for stimulating stem cell self-renewal has not yet been identified. Discovery of such factors should be of great interest in gene therapy and bone marrow transplant applications

Briefly, polystyrene, non tissue culture treated, 96-well plates are coated with fn fragment at a coating concentration of 0.2 $\mu g/ cm^2$. Mouse bone marrow cells are plated (1,000 cells/well) in 0.2 ml of serum-free medium. Cells cultured in the presence of IL-3 (5 ng/ml) + SCF (50 ng/ml) would serve as the positive control, conditions under which little self-renewal but pronounced differentiation of the stem

cells is to be expected. Gene products of the invention (e.g., including, but not limited to, polynucleotides and polypeptides of the present invention, and supernatants produced in Example 31), are tested with appropriate negative controls in the presence and absence of SCF(5.0 ng/ml), where test factor supernates represent 10% of the total assay volume. The plated cells are then allowed to grow by incubating in a low oxygen environment (5% CO_2, 7% O_2, and 88% N_2) tissue culture incubator for 7 days. The number of proliferating cells within the wells is then quantitated by measuring thymidine incorporation into cellular DNA. Verification of the positive hits in the assay will require phenotypic characterization of the cells, which can be accomplished by scaling up of the culture system and using appropriate antibody reagents against cell surface antigens and FACScan.

One skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides (e.g., gene therapy), antibodies, agonists, and/or antagonists and fragments and variants thereof.

If a particular polypeptide of the present invention is found to be a stimulator of hematopoietic progenitors, polynucleotides and polypeptides corresponding to the gene encoding said polypeptide may be useful for the diagnosis and treatment of disorders affecting the immune system and hematopoiesis. Representative uses are described in the "Immune Activity" and "Infectious Disease" sections above, and elsewhere herein. The gene product may also be useful in the expansion of stem cells and committed progenitors of various blood lineages, and in the differentiation and/or proliferation of various cell types.

Additionally, the polynucleotides and/or polypeptides of the gene of interest and/or agonists and/or antagonists thereof, may also be employed to inhibit the proliferation and differentiation of hematopoietic cells and therefore may be employed to protect bone marrow stem cells from chemotherapeutic agents during chemotherapy. This antiproliferative effect may allow administration of higher doses of chemotherapeutic agents and, therefore, more effective chemotherapeutic treatment.

Moreover, polynucleotides and polypeptides corresponding to the gene of

interest may also be useful for the treatment and diagnosis of hematopoietic related disorders such as, for example, anemia, pancytopenia, leukopenia, thrombocytopenia or leukemia since stromal cells are important in the production of cells of hematopoietic lineages. The uses include bone marrow cell ex-vivo culture, bone marrow transplantation, bone marrow reconstitution, radiotherapy or chemotherapy of neoplasia.

Example 44: Human Dermal Fibroblast and Aortic Smooth Muscle Cell Proliferation

The polypeptide of interest is added to cultures of normal human dermal fibroblasts (NHDF) and human aortic smooth muscle cells (AoSMC) and two co-assays are performed with each sample. The first assay examines the effect of the polypeptide of interest on the proliferation of normal human dermal fibroblasts (NHDF) or aortic smooth muscle cells (AoSMC). Aberrant growth of fibroblasts or smooth muscle cells is a part of several pathological processes, including fibrosis, and restenosis. The second assay examines IL6 production by both NHDF and SMC. IL6 production is an indication of functional activation. Activated cells will have increased production of a number of cytokines and other factors, which can result in a proinflammatory or immunomodulatory outcome. Assays are run with and without co-TNFa stimulation, in order to check for costimulatory or inhibitory activity.

Briefly, on day 1, 96-well black plates are set up with 1000 cells/well (NHDF) or 2000 cells/well (AoSMC) in 100 µl culture media. NHDF culture media contains: Clonetics FB basal media, 1mg/ml hFGF, 5mg/ml insulin, 50mg/ml gentamycin, 2%FBS, while AoSMC culture media contains Clonetics SM basal media, 0.5 µg/ml hEGF, 5mg/ml insulin, 1µg/ml hFGF, 50mg/ml gentamycin, 50 µg/ml Amphotericin B, 5%FBS. After incubation at 37°C for at least 4-5 hours, culture media is aspirated and replaced with growth arrest media. Growth arrest media for NHDF contains fibroblast basal media, 50mg/ml gentamycin, 2% FBS, while growth arrest media for AoSMC contains SM basal media, 50mg/ml gentamycin, 50µg/ml Amphotericin B, 0.4% FBS. Incubate at 37°C until day 2.

On day 2, serial dilutions and templates of the polypeptide of interest are designed such that they always include media controls and known-protein controls. For both stimulation and inhibition experiments, proteins are diluted in growth arrest media. For inhibition experiments, TNFa is added to a final concentration of 2ng/ml (NHDF) or 5ng/ml (AoSMC). Add 1/3 vol media containing controls or polypeptides of the present invention and incubate at 37°C/5% CO_2 until day 5.

Transfer 60µl from each well to another labeled 96-well plate, cover with a plate-sealer, and store at 4°C until Day 6 (for IL6 ELISA). To the remaining 100 µl in the cell culture plate, aseptically add Alamar Blue in an amount equal to 10% of the culture volume (10µl). Return plates to incubator for 3 to 4 hours. Then measure fluorescence with excitation at 530nm and emission at 590nm using the CytoFluor. This yields the growth stimulation/inhibition data.

On day 5, the IL6 ELISA is performed by coating a 96 well plate with 50-100 ul/well of Anti-Human IL6 Monoclonal antibody diluted in PBS, pH 7.4, incubate ON at room temperature.

On day 6, empty the plates into the sink and blot on paper towels. Prepare Assay Buffer containing PBS with 4% BSA. Block the plates with 200 µl/well of Pierce Super Block blocking buffer in PBS for 1-2 hr and then wash plates with wash buffer (PBS, 0.05% Tween-20). Blot plates on paper towels. Then add 50 µl/well of diluted Anti-Human IL-6 Monoclonal, Biotin-labeled antibody at 0.50 mg/ml. Make dilutions of IL-6 stock in media (30, 10, 3, 1, 0.3, 0 ng/ml). Add duplicate samples to top row of plate. Cover the plates and incubate for 2 hours at RT on shaker. Plates are washed with wash buffer and blotted on paper towels. Dilute EU-labeled Streptavidin 1:1000 in Assay buffer, and add 100 µl/well. Cover the plate and incubate 1 h at RT. Plates are again washed with wash buffer and blotted on paper towels. Add 100 µl/well of Enhancement Solution and shake for 5 minutes. Read the plate on the Wallac DELFIA Fluorometer. Readings from triplicate samples in each assay are tabulated and averaged.

A positive result in this assay suggests AoSMC cell proliferation and that the polypeptide of the present invention may be involved in dermal fibroblast

proliferation and/or smooth muscle cell proliferation. A positive result also suggests many potential uses of polypeptides, polynucleotides, agonists and/or antagonists of the polynucleotide/polypeptide of the present invention which gives a positive result. For example, inflammation and immune responses, wound healing, and angiogenesis, as detailed throughout this specification. Particularly, polypeptides of the present invention and polynucleotides of the present invention may be used in wound healing and dermal regeneration, as well as the promotion of vasculargenesis, both of the blood vessels and lymphatics. The growth of vessels can be used in the treatment of, for example, cardiovascular diseases. Additionally, antagonists of polypeptides and polynucleotides of the invention may be useful in treating diseases, disorders, and/or conditions which involve angiogenesis by acting as an anti-vascular (e.g., anti-angiogenesis). These diseases, disorders, and/or conditions are known in the art and/or are described herein, such as, for example, malignancies, solid tumors, benign tumors, for example hemangiomas, acoustic neuromas, neurofibromas, trachomas, and pyogenic granulomas; artheroscleric plaques; ocular angiogenic diseases, for example, diabetic retinopathy, retinopathy of prematurity, macular degeneration, corneal graft rejection, neovascular glaucoma, retrolental fibroplasia, rubeosis, retinoblastoma, uvietis and Pterygia (abnormal blood vessel growth) of the eye; rheumatoid arthritis; psoriasis; delayed wound healing; endometriosis; vasculogenesis; granulations; hypertrophic scars (keloids); nonunion fractures; scleroderma; trachoma; vascular adhesions; myocardial angiogenesis; coronary collaterals; cerebral collaterals; arteriovenous malformations; ischemic limb angiogenesis; Osler-Webber Syndrome; plaque neovascularization; telangiectasia; hemophiliac joints; angiofibroma; fibromuscular dysplasia; wound granulation; Crohn's disease; and atherosclerosis. Moreover, antagonists of polypeptides and polynucleotides of the invention may be useful in treating anti-hyperproliferative diseases and/or anti-inflammatory known in the art and/or described herein.

One skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides (e.g., gene therapy), antibodies, agonists, and/or antagonists and fragments and variants thereof.

Example 45: Cellular Adhesion Molecule (CAM) Expression on Endothelial Cells

The recruitment of lymphocytes to areas of inflammation and angiogenesis involves specific receptor-ligand interactions between cell surface adhesion molecules (CAMs) on lymphocytes and the vascular endothelium. The adhesion process, in both normal and pathological settings, follows a multi-step cascade that involves intercellular adhesion molecule-1 (ICAM-1), vascular cell adhesion molecule-1 (VCAM-1), and endothelial leukocyte adhesion molecule-1 (E-selectin) expression on endothelial cells (EC). The expression of these molecules and others on the vascular endothelium determines the efficiency with which leukocytes may adhere to the local vasculature and extravasate into the local tissue during the development of an inflammatory response. The local concentration of cytokines and growth factor participate in the modulation of the expression of these CAMs.

Briefly, endothelial cells (e.g., Human Umbilical Vein Endothelial cells (HUVECs)) are grown in a standard 96 well plate to confluence, growth medium is removed from the cells and replaced with 100 µl of 199 Medium (10% fetal bovine serum (FBS)). Samples for testing and positive or negative controls are added to the plate in triplicate (in 10 µl volumes). Plates are then incubated at 37°C for either 5 h (selectin and integrin expression) or 24 h (integrin expression only). Plates are aspirated to remove medium and 100 µl of 0.1% paraformaldehyde-PBS(with Ca++ and Mg++) is added to each well. Plates are held at 4°C for 30 min. Fixative is removed from the wells and wells are washed 1X with PBS(+Ca,Mg) + 0.5% BSA and drained. 10 µl of diluted primary antibody is added to the test and control wells. Anti-ICAM-1-Biotin, Anti-VCAM-1-Biotin and Anti-E-selectin-Biotin are used at a concentration of 10 µg/ml (1:10 dilution of 0.1 mg/ml stock antibody). Cells are incubated at 37°C for 30 min. in a humidified environment. Wells are washed three times with PBS(+Ca,Mg) + 0.5% BSA. 20 µl of diluted ExtrAvidin-Alkaline Phosphotase (1:5,000 dilution, refered to herein as the working dilution) are added to

each well and incubated at 37°C for 30 min. Wells are washed three times with PBS(+Ca,Mg)+0.5% BSA. Dissolve 1 tablet of p-Nitrophenol Phosphate pNPP per 5 ml of glycine buffer (pH 10.4). 100 µl of pNPP substrate in glycine buffer is added to each test well. Standard wells in triplicate are prepared from the working dilution of the ExtrAvidin-Alkaline Phosphotase in glycine buffer: 1:5,000 (10^0) > $10^{-0.5}$ > 10^{-1} > $10^{-1.5}$. 5 µl of each dilution is added to triplicate wells and the resulting AP content in each well is 5.50 ng, 1.74 ng, 0.55 ng, 0.18 ng. 100 µl of pNNP reagent is then added to each of the standard wells. The plate is incubated at 37°C for 4h. A volume of 50 µl of 3M NaOH is added to all wells. The plate is read on a plate reader at 405 nm using the background subtraction option on blank wells filled with glycine buffer only. Additionally, the template is set up to indicate the concentration of AP-conjugate in each standard well [5.50 ng; 1.74 ng; 0.55 ng; 0.18 ng]. Results are indicated as amount of bound AP-conjugate in each sample.

Example 46: Alamar Blue Endothelial Cells Proliferation Assay

This assay may be used to quantitatively determine protein mediated inhibition of bFGF-induced proliferation of Bovine Lymphatic Endothelial Cells (LECs), Bovine Aortic Endothelial Cells (BAECs) or Human Microvascular Uterine Myometrial Cells (UTMECs). This assay incorporates a fluorometric growth indicator based on detection of metabolic activity. A standard Alamar Blue Proliferation Assay is prepared in EGM-2MV with 10 ng /ml of bFGF added as a source of endothelial cell stimulation. This assay may be used with a variety of endothelial cells with slight changes in growth medium and cell concentration. Dilutions of the protein batches to be tested are diluted as appropriate. Serum-free medium (GIBCO SFM) without bFGF is used as a non-stimulated control and Angiostatin or TSP-1 are included as a known inhibitory controls.

Briefly, LEC, BAECs or UTMECs are seeded in growth media at a density of 5000 to 2000 cells/well in a 96 well plate and placed at 37-C overnight. After the overnight incubation of the cells, the growth media is removed and replaced with

GIBCO EC-SFM. The cells are treated with the appropriate dilutions of the protein of interest or control protein sample(s) (prepared in SFM) in triplicate wells with additional bFGF to a concentration of 10 ng/ ml. Once the cells have been treated with the samples, the plate(s) is/are placed back in the 37° C incubator for three days. After three days 10 ml of stock alamar blue (Biosource Cat# DAL1100) is added to each well and the plate(s) is/are placed back in the 37°C incubator for four hours. The plate(s) are then read at 530nm excitation and 590nm emission using the CytoFluor fluorescence reader. Direct output is recorded in relative fluorescence units.

Alamar blue is an oxidation-reduction indicator that both fluoresces and changes color in response to chemical reduction of growth medium resulting from cell growth. As cells grow in culture, innate metabolic activity results in a chemical reduction of the immediate surrounding environment. Reduction related to growth causes the indicator to change from oxidized (non-fluorescent blue) form to reduced (fluorescent red) form. i.e. stimulated proliferation will produce a stronger signal and inhibited proliferation will produce a weaker signal and the total signal is proportional to the total number of cells as well as their metabolic activity. The background level of activity is observed with the starvation medium alone. This is compared to the output observed from the positive control samples (bFGF in growth medium) and protein dilutions.

Example 47: Detection of Inhibition of a Mixed Lymphocyte Reaction

This assay can be used to detect and evaluate inhibition of a Mixed Lymphocyte Reaction (MLR) by gene products (e.g., isolated polypeptides). Inhibition of a MLR may be due to a direct effect on cell proliferation and viability, modulation of costimulatory molecules on interacting cells, modulation of adhesiveness between lymphocytes and accessory cells, or modulation of cytokine production by accessory cells. Multiple cells may be targeted by these polypeptides since the peripheral blood mononuclear fraction used in this assay includes T, B and

natural killer lymphocytes, as well as monocytes and dendritic cells.

Polypeptides of interest found to inhibit the MLR may find application in diseases associated with lymphocyte and monocyte activation or proliferation. These include, but are not limited to, diseases such as asthma, arthritis, diabetes, inflammatory skin conditions, psoriasis, eczema, systemic lupus erythematosus, multiple sclerosis, glomerulonephritis, inflammatory bowel disease, crohn's disease, ulcerative colitis, arteriosclerosis, cirrhosis, graft vs. host disease, host vs. graft disease, hepatitis, leukemia and lymphoma.

Briefly, PBMCs from human donors are purified by density gradient centrifugation using Lymphocyte Separation Medium (LSM®, density 1.0770 g/ml, Organon Teknika Corporation, West Chester, PA). PBMCs from two donors are adjusted to 2 x 10^6 cells/ml in RPMI-1640 (Life Technologies, Grand Island, NY) supplemented with 10% FCS and 2 mM glutamine. PBMCs from a third donor is adjusted to 2 x 10^5 cells/ml. Fifty microliters of PBMCs from each donor is added to wells of a 96-well round bottom microtiter plate. Dilutions of test materials (50 μl) is added in triplicate to microtiter wells. Test samples (of the protein of interest) are added for final dilution of 1:4; rhuIL-2 (R&D Systems, Minneapolis, MN, catalog number 202-IL) is added to a final concentration of 1 μg/ml; anti-CD4 mAb (R&D Systems, clone 34930.11, catalog number MAB379) is added to a final concentration of 10 μg/ml. Cells are cultured for 7-8 days at 37°C in 5% CO_2, and 1 μC of [^{3}H] thymidine is added to wells for the last 16 hrs of culture. Cells are harvested and thymidine incorporation determined using a Packard TopCount. Data is expressed as the mean and standard deviation of triplicate determinations.

Samples of the protein of interest are screened in separate experiments and compared to the negative control treatment, anti-CD4 mAb, which inhibits proliferation of lymphocytes and the positive control treatment, IL-2 (either as recombinant material or supernatant), which enhances proliferation of lymphocytes.

One skilled in the art could easily modify the exemplified studies to test the activity of polynucleotides (e.g., gene therapy), antibodies, agonists, and/or antagonists and fragments and variants thereof.

It will be clear that the invention may be practiced otherwise than as particularly described in the foregoing description and examples. Numerous modifications and variations of the present invention are possible in light of the above teachings and, therefore, are within the scope of the appended claims.

The entire disclosure of each document cited (including patents, patent applications, journal articles, abstracts, laboratory manuals, books, or other disclosures) in the Background of the Invention, Detailed Description, and Examples is hereby incorporated herein by reference. Further, the hard copy of the sequence listing submitted herewith and the corresponding computer readable form are both incorporated herein by reference in their entireties. Moreover, the hard copy of and the corresponding computer readable form of the Sequence Listing of Serial No. 60/124,270 are also incorporated herein by reference in their entireties.

411

Applicant's or agent's file reference number	PA103PCT	International applicatio[illegible]o.

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209059

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application RO/US 08 MAR2000	☐ This sheet was received by the International Bureau on:
Authorized officer Yolanda Harrod PCT/Internat'l Appl Processing Div. (703) 305-3670	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 209059

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209059

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

414

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution: American Type Culture Collection

Address of depositary institution *(including postal code and country)*:
10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209060

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 08MAR2000

Authorized officer
Yolanda Harrod
PCT/Internat'l Appl Processing Dir.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 209060

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209060

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

Applicant's or agent's file reference number	PA103PCT	International application N

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT — Further deposits are identified on an additional sheet ☐

Name of depositary institution: American Type Culture Collection

Address of depositary institution *(including postal code and country)*:

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209061

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* — This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03 MAR2000

Authorized officer Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3870

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209061

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209061

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

420

Applicant's or agent's file reference number	PA103PCT	International applicatio

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209062

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application RO/US 03 MAR 2000	☐ This sheet was received by the International Bureau on:
Authorized officer Yolanda Harrod PCT/Internat'l Appl Processing Dte (703) 305-3570	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 209062

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209062

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

Applicant's or agent's file reference number	PA103PCT	International application i

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution: American Type Culture Collection

Address of depositary institution *(including postal code and country)*:

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209063

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 22 MAR2000

Authorized officer: Yolanda Harrod
PCT/Internat'l Appl Processing Dir.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209063

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209063

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

Applicant's or agent's file reference number	PA103PCT	International applicatior

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. **IDENTIFICATION OF DEPOSIT** Further deposits are identified on an additional sheet ☐

Name of depositary institution: American Type Culture Collection

Address of depositary institution *(including postal code and country)*:
10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209064

C. **ADDITIONAL INDICATIONS** *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. **DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE** *(if the indications are not for all designated States)*

E. **SEPARATE FURNISHING OF INDICATIONS** *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 08 MAR2000

Authorized officer

Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-9670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209064

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209064

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

429

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution: American Type Culture Collection

Address of depositary institution *(including postal code and country)*:

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209065

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03 MAR 2000

Authorized officer: Yolanda Harroo
PCT/Int'l Appl Processing Div.
(703) 305-3870

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209065

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209065

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

Applicant's or agent's file reference number	PA103PCT	International applicatior

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209066

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03MAR2000

Authorized officer

Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3870

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209066

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209066

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

435

Applicant's or agent's file reference number	PA103PCT	International applicatior

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209067

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03 MAR2000

Authorized officer

Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209067

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209067

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209068

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application RO/US 03 MAR2000	☐ This sheet was received by the International Bureau on:
Authorized officer Yolanda Harrod PCT/Internat'l Appl Processing Div. (703) 305-3670	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 209068

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209068

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

441

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution
American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
20 May 1997	209069

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application RO/US 03 MAR2000	☐ This sheet was received by the International Bureau on:
Authorized officer Victoria Harrod PCT/Internat'l Appl Processing Div. (703) 305-3670	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 209069

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209069

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

444

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution
American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
12 January 1998	209579

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application	☐ This sheet was received by the International Bureau on:
22MAR2000	
Authorized officer	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 209579

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209579

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
12 January 1998	209578

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03 MAR 2000

Authorized officer

Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3870

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 209578

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 209578

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

450

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
16 July 1998	203067

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03MAR2000

Authorized officer: Sharla Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 203067

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 203067

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

453

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution
American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
16 July 1998	203068

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application	☐ This sheet was received by the International Bureau on:
RO/US 08MAR2000	
Authorized officer Yolanda Harrod PCT/Internat'l Appl Processing Div. (703) 305-3670	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 203068

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 203068

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

456

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
1 February 1999	203609

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application RO/US 03MAR2000	☐ This sheet was received by the International Bureau on:
Authorized officer Yolanda Harrod PCT/Internat'l Appl Processing Div. (703) 305-9[illegible]	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 203609

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 203609

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

459

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
1 February 1999	203610

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03 MAR 2000

Authorized officer Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. 203610

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 203610

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

462

Applicant's or agent's file reference number	PA103PCT	International application

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
17 November 1998	203485

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US . 08 MAR 2000

Authorized officer Yolanda Harrod
PCT/Internat'l Appl Processing Dir.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. 203485

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. 203485

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

465

Applicant's or agent's file reference number	PA103PCT	International application No

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
18 June 1999	PTA-252

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03 MAR 2000

Authorized officer

Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3671

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. PTA-252

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. PTA-252

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

468

Applicant's or agent's file reference number	PA103PCT	International application N°

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
18 June 1999	PTA-253

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only	For International Bureau use only
☑ This sheet was received with the international application RO/US 03MAR2000	☐ This sheet was received by the International Bureau on:
Authorized officer Yolanda Harrod PCT/Internat'l Appl Processing Div. (703) 305-3670	Authorized officer

Form PCT/RO/134 (July 1992)

ATCC Deposit No. PTA-253

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. PTA-253

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

471

Applicant's or agent's file reference number	PA103PCT	International application No.

INDICATIONS RELATING TO A DEPOSITED MICROORGANISM

(PCT Rule 13*bis*)

A. The indications made below relate to the microorganism referred to in the description on page 72, line N/A.

B. IDENTIFICATION OF DEPOSIT Further deposits are identified on an additional sheet ☐

Name of depositary institution

American Type Culture Collection

Address of depositary institution *(including postal code and country)*

10801 University Boulevard
Manassas, Virginia 20110-2209
United States of America

Date of deposit	Accession Number
22 December 1999	PTA-1081

C. ADDITIONAL INDICATIONS *(leave blank if not applicable)* This information is continued on an additional sheet ☐

D. DESIGNATED STATES FOR WHICH INDICATIONS ARE MADE *(if the indications are not for all designated States)*

E. SEPARATE FURNISHING OF INDICATIONS *(leave blank if not applicable)*

The indications listed below will be submitted to the International Bureau later *(specify the general nature of the indications e.g., "Accession Number of Deposit")*

For receiving Office use only

☑ This sheet was received with the international application

RO/US 03MAR2000

Authorized officer Yolanda Harrod
PCT/Internat'l Appl Processing Div.
(703) 305-3670

For International Bureau use only

☐ This sheet was received by the International Bureau on:

Authorized officer

ATCC Deposit No. PTA-1081

CANADA

The applicant requests that, until either a Canadian patent has been issued on the basis of an application or the application has been refused, or is abandoned and no longer subject to reinstatement, or is withdrawn, the Commissioner of Patents only authorizes the furnishing of a sample of the deposited biological material referred to in the application to an independent expert nominated by the Commissioner, the applicant must, by a written statement, inform the International Bureau accordingly before completion of technical preparations for publication of the international application.

NORWAY

The applicant hereby requests that the application has been laid open to public inspection (by the Norwegian Patent Office), or has been finally decided upon by the Norwegian Patent Office without having been laid open inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Norwegian Patent Office not later than at the time when the application is made available to the public under Sections 22 and 33(3) of the Norwegian Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on the list of recognized experts drawn up by the Norwegian Patent Office or any person approved by the applicant in the individual case.

AUSTRALIA

The applicant hereby gives notice that the furnishing of a sample of a microorganism shall only be effected prior to the grant of a patent, or prior to the lapsing, refusal or withdrawal of the application, to a person who is a skilled addressee without an interest in the invention (Regulation 3.25(3) of the Australian Patents Regulations).

FINLAND

The applicant hereby requests that, until the application has been laid open to public inspection (by the National Board of Patents and Regulations), or has been finally decided upon by the National Board of Patents and Registration without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art.

UNITED KINGDOM

The applicant hereby requests that the furnishing of a sample of a microorganism shall only be made available to an expert. The request to this effect must be filed by the applicant with the International Bureau before the completion of the technical preparations for the international publication of the application.

Page 2
ATCC Deposit No. PTA-1081

DENMARK

The applicant hereby requests that, until the application has been laid open to public inspection (by the Danish Patent Office), or has been finally decided upon by the Danish Patent office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the Danish Patent Office not later that at the time when the application is made available to the public under Sections 22 and 33(3) of the Danish Patents Act. If such a request has been filed by the applicant, any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Danish Patent Office or any person by the applicant in the individual case.

SWEDEN

The applicant hereby requests that, until the application has been laid open to public inspection (by the Swedish Patent Office), or has been finally decided upon by the Swedish Patent Office without having been laid open to public inspection, the furnishing of a sample shall only be effected to an expert in the art. The request to this effect shall be filed by the applicant with the International Bureau before the expiration of 16 months from the priority date (preferably on the Form PCT/RO/134 reproduced in annex Z of Volume I of the PCT Applicant's Guide). If such a request has been filed by the applicant any request made by a third party for the furnishing of a sample shall indicate the expert to be used. That expert may be any person entered on a list of recognized experts drawn up by the Swedish Patent Office or any person approved by a applicant in the individual case.

NETHERLANDS

The applicant hereby requests that until the date of a grant of a Netherlands patent or until the date on which the application is refused or withdrawn or lapsed, the microorganism shall be made available as provided in the 31F(1) of the Patent Rules only by the issue of a sample to an expert. The request to this effect must be furnished by the applicant with the Netherlands Industrial Property Office before the date on which the application is made available to the public under Section 22C or Section 25 of the Patents Act of the Kingdom of the Netherlands, whichever of the two dates occurs earlier.

What Is Claimed Is:

1. An isolated nucleic acid molecule comprising a polynucleotide having a nucleotide sequence at least 95% identical to a sequence selected from the group consisting of:

(a) a polynucleotide fragment of SEQ ID NO:X or a polynucleotide fragment of the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X;

(b) a polynucleotide encoding a polypeptide fragment of SEQ ID NO:Y or a polypeptide fragment encoded by the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X;

(c) a polynucleotide encoding a polypeptide fragment of a polypeptide encoded by SEQ ID NO:X or a polypeptide fragment encoded by the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X;

(d) a polynucleotide encoding a polypeptide domain of SEQ ID NO:Y or a polypeptide domain encoded by the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X;

(e) a polynucleotide encoding a polypeptide epitope of SEQ ID NO:Y or a polypeptide epitope encoded by the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X;

(f) a polynucleotide encoding a polypeptide of SEQ ID NO:Y or the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X, having biological activity;

(g) a polynucleotide which is a variant of SEQ ID NO:X;

(h) a polynucleotide which is an allelic variant of SEQ ID NO:X;

(i) a polynucleotide which encodes a species homologue of the SEQ ID NO:Y;

(j) a polynucleotide capable of hybridizing under stringent conditions to any one of the polynucleotides specified in (a)-(i), wherein said polynucleotide does not hybridize under stringent conditions to a nucleic acid molecule having a nucleotide

sequence of only A residues or of only T residues.

2. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises a nucleotide sequence encoding a protein.

3. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises a nucleotide sequence encoding the sequence identified as SEQ ID NO:Y or the polypeptide encoded by the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X.

4. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises the entire nucleotide sequence of SEQ ID NO:X or the cDNA sequence included in the related cDNA clone, which is hybridizable to SEQ ID NO:X.

5. The isolated nucleic acid molecule of claim 2, wherein the nucleotide sequence comprises sequential nucleotide deletions from either the C-terminus or the N-terminus.

6. The isolated nucleic acid molecule of claim 3, wherein the nucleotide sequence comprises sequential nucleotide deletions from either the C-terminus or the N-terminus.

7. A recombinant vector comprising the isolated nucleic acid molecule of claim 1.

8. A method of making a recombinant host cell comprising the isolated nucleic acid molecule of claim 1.

9. A recombinant host cell produced by the method of claim 8.

10. The recombinant host cell of claim 9 comprising vector sequences.

11. An isolated polypeptide comprising an amino acid sequence at least 95% identical to a sequence selected from the group consisting of:

(a) a polypeptide fragment of SEQ ID NO:Y or of the sequence encoded by the cDNA included in the related cDNA clone;

(b) a polypeptide fragment of SEQ ID NO:Y or of the sequence encoded by the cDNA included in the related cDNA clone, having biological activity;

(c) a polypeptide domain of SEQ ID NO:Y or of the sequence encoded by the cDNA included in the related cDNA clone;

(d) a polypeptide epitope of SEQ ID NO:Y or of the sequence encoded by the cDNA included in the related cDNA clone;

(e) a full length protein of SEQ ID NO:Y or of the sequence encoded by the cDNA included in the related cDNA clone;

(f) a variant of SEQ ID NO:Y;

(g) an allelic variant of SEQ ID NO:Y; or

(h) a species homologue of the SEQ ID NO:Y.

12. The isolated polypeptide of claim 11, wherein the full length protein comprises sequential amino acid deletions from either the C-terminus or the N-terminus.

13. An isolated antibody that binds specifically to the isolated polypeptide of claim 11.

14. A recombinant host cell that expresses the isolated polypeptide of claim 11.

15. A method of making an isolated polypeptide comprising:

(a) culturing the recombinant host cell of claim 14 under conditions such that said polypeptide is expressed; and

(b) recovering said polypeptide.

16. The polypeptide produced by claim 15.

17. A method for preventing, treating, or ameliorating a medical condition, comprising administering to a mammalian subject a therapeutically effective amount of the polypeptide of claim 11 or the polynucleotide of claim 1.

18. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:

(a) determining the presence or absence of a mutation in the polynucleotide of claim 1; and

(b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or absence of said mutation.

19. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:

(a) determining the presence or amount of expression of the polypeptide of claim 11 in a biological sample; and

(b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or amount of expression of the polypeptide.

20. A method for identifying a binding partner to the polypeptide of claim 11 comprising:

(a) contacting the polypeptide of claim 11 with a binding partner; and

(b) determining whether the binding partner effects an activity of the polypeptide.

21. The gene corresponding to the cDNA sequence of SEQ ID NO:Y.

22. A method of identifying an activity in a biological assay, wherein the method comprises:

(a) expressing SEQ ID NO:X in a cell;

(b) isolating the supernatant;

(c) detecting an activity in a biological assay; and

(d) identifying the protein in the supernatant having the activity.

23. The product produced by the method of claim 20.

SEQUENCE LISTING

<110> Craig Rosen,
Steve Ruben

<120> Human Breast and Ovarian Cancer Associated Gene Sequences and Polypeptides

<130> PA103PCT

<140> Unassigned
<141> 2000-03-08

<150> 60/124,270
<151> 1999-03-12

<160> 846

<170> PatentIn Ver. 2.0

<210> 1
<211> 1913
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (6)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (944)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1418)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1908)
<223> n equals a,t,g, or c

<400> 1
ggtcanagac tggttcctgt ggtatgtgaa gaagtgtgga ggcacaacaa gaatcatctc 60
gacaacaaat ggaggacagg agaggaaatt tgtgggcgga tctggtcaag tgagtgagcg 120
gataatggac ctccttggag accgagtgaa gctggagagg cctgtgatct acattgacca 180
gacaagagaa aatgtccttg tggagaccct aaaccatgag atgtatgagg ctaaatatgt 240
gattagtgct attcctccta ctctgggcat gaagattcac ttcaatcccc ctctgccaat 300

gatgagaaac cagatgatca ctcgtgtgcc tttgggttca gtcatcaagt gtatagttta 360
ttataaagag cctttctgga ggaaaaagga ttactgtgga accatgatta ttgatggaga 420
agaagctcca gttgcctaca cgttggatga taccaaacct gaaggcaact atgctgccat 480
aatgggattt atcctggccc acaaagccag aaaactggca cgtcttacca aagaggaaag 540
gttgaagaaa ctttgtgaac tctatgccaa ggttctgggt tccctagaag ctctggagcc 600
agtgcattat gaagaaaaga actggtgtga ggagcagtac tctgggggct gctacacaac 660
ttatttcccc cctgggatcc tgactcaata tggaagggtt ctacgccagc cagtggacag 720
gatttacttt gcaggcaccg agactgccac acactggagc ggctacatgg agggggctgt 780
agaggccggg gagagagcag cccgagagat cctgcatgcc atggggaaga ttccagagga 840
tgaaatctgg cagtcagaac cagagtctgt ggatgtccct gcacagccca tcaccaccac 900
ctttttggag agacatttgc cctccgtgcc aggcctgctc aggntgattg gattgaccac 960
catcttttca gcaacggctc ttggcttcct ggcccacaaa agggggctac ttgtgagagt 1020
ctaaagagag agggtgtctg taatcacact ctcttcttac tgtatttggg atatgagttt 1080
ggggaaagag ttgcagtaaa gttccatgaa gacaaatagt gtggagtgag gcggggagca 1140
tgaagataaa tccaactctg actgtaaaat acatggtatc tctttctccg ttgtggcccc 1200
tgcttagtgt cccttacctg gcttagcgtt ctgtttcacc agtttccaag tttattgccc 1260
tcaaaatctt tagaatagtt aaattggctt gtttaaggtt cttgctgccc cacaacacac 1320
cttgcccatg cacaaggaat gaatttttc ctaccattat ggctttgtgc ttgttcttcc 1380
tcttacctgt aatagcctca ccttccctag ttctttgnca ttcgtcctta gaatactgta 1440
ttgttacagc tgaaagacag taaagaccat ttagtcctca ccttctgttt tagagttgag 1500
caaactgaag cccacagagg tggaacttaa ttacctaaga gccacaataa gccactggta 1560
tctgggggac tagaacacaa atccaacgct tttcccacct ctttggatgt tttccccaat 1620
tatcctcctt cactccctgt catagttacc gatggtgtcc cgttgtgtgg gtttactctg 1680
tgctaagttg tcttacactt ctcaaatgct actcagtata tagccttaag tcttactgtt 1740
ttgtgcggtg tgtctccagc tgattttaac ttttttgatg gtagaaattt tatctcttct 1800
tccttttgta tcctccattg tatcttcata caaaggacag tacacacttg ggtaattaaa 1860
aataaaagtt gattgaccat aaaaaaaaaa aaaggggggg ccgcccangg ggg 1913

<210> 2
<211> 1425
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (790)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (842)
<223> n equals a,t,g, or c

<400> 2
acttatttat cctgcttgaa agctacttgm gatgtgtact gctattctaa acacgtgatc 60
tagtttcttt catctctggc ataagattat ataacttaat gttaagtgtc ttgmggcata 120
aaagacaaaa tgtggcttat tttaggatct gttttttcat cgaggtctcg ggtatccttt 180
caaagatagt garaagcaga cactgctcct tgtgcagctc tggtacctcc tgcccactgc 240
tgtcacttca agccactggc aatgcttctg tcctcgtgtc ttggaggaaa atcacctggg 300
gggaggggac ttcttgtggt aagagcaagt gcaggtatga aatgcgaaga ttgccccagc 360
taaaagtgga caagtccgct ttgtgagatg aatacttcct gagaaacttg acaagtatct 420

ctccatttta ccattatgaa aactatcatt aaaaaaaaca gtttagatgc cttctccttt 480
tgagggaaaa agggtgcttt ttattgtata aagcagcgtc ttatgtattt tgatatacca 540
ttgtttgaac ttccgtcttt agctgataga ttctcaaata tccttgattt tggatgttca 600
gtatgtttgt gagagaggtt tctgggaaga ctctcttttt gccctcggga aaaagcaaaa 660
tatcaatgtt tgggtgactg tgtaaagctc agtgtgtaag aacatctttt tgtctaggtt 720
ttctttctgc tctttattga agacaaacac tcaccaaaaa gaaaaataaa agttttcaga 780
gaaactaatn ttcyttgggc aagagtatta cytaaatatt tkggccyccy aaagttyccc 840
ynagtwagta ctcggacycc tgtgctaatt gtcagcytac atatcattgt atagagactg 900
tttawtctgt accaaactga tttcaaaagt actacattga aaataaaccg gtgactgttt 960
ttcttcataa agttctgcgt ttggcatctt cactctttcc aaaatgtatc tgtacatcag 1020
aaatgtcact attccaagtg tcttttttagt gtggctttag tatggcttcc ttttaatatt 1080
gtacatacat tgtatctttg ttttatggta ataagtaata aaaatgtaga cttcatattt 1140
tgtacaaaat gtcctatgta cagaataaaa aagttcatag aaacagcaaa tataggtaag 1200
tggcacaatt atttttcttt agaaaatatc tgtaacttta tgcattagtg aaatgttaag 1260
taccgacata ttttttaaca ttttgtaatt caaaactttt tgttttgaca ttgtttatga 1320
agagaaactt catacacttg ccatttaata tgctctttta tctaattttc aaaaactcta 1380
aaaaacggtg tatcatatgg actaaataaa gaacatgtga atttt 1425

<210> 3
<211> 354
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (246)
<223> n equals a,t,g, or c

<400> 3
ggcacgagaa ccatttccac tatatattcc ttcggataac taraaattaa awtatttggt 60
gtattatttg caaggagtca aagatgatgt cttttcccag aggcatgaac cttagaaatg 120
ctttcgatgg ggatgtttct gtaacactgt gttattctgg atcttcaaat aatagcaaag 180
ccaattactc taaatgtaaa atttttctat tcccaaggtt cacttttgtt tggtaggttt 240
tcacgntttt aaatactgtt taatggaaga aaaatacgta gccaggcgtg gtggctcaca 300
cctgtagccc cggaactttg ggagactgaa gcgggcagat cacgaggtca ggag 354

<210> 4
<211> 514
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (502)
<223> n equals a,t,g, or c

<400> 4
agacgcacgc gtactgctcc aacctcagct tccgcctcta cgaccagtgg cgagcctgga 60
tgcagaagtc gcacaagacc cgcaaccagc acaggacgag gggatcctgc cctcgggcag 120
acggggcacg gcgagaggtc ctgccagata agctgtaggg gctcaggcca ccctccctgc 180
cacgtggaga cgcagaggcc gaacccaaac tggggccacc tctgtaccct cacttcaggg 240

cacctgagcc accctcagca ggagctgggg tggcccctga gctccaacgg ccataacagc 300
tctgactccc acgtgaggcc acctttgggt gcaccccagt gggtgtgtgt gtgtgtgtga 360
gggttggttg agttgcctag aacccctgcc agggctgggg gtgagaaggg gagtcattac 420
tccccattac ctagggcccc tccaaaagag tccttttaaa taaatgagct atttaggtgc 480
wraaaaaaaa aaaaaaaaac cncgggggggg gccc 514

<210> 5
<211> 2035
<212> DNA
<213> Homo sapiens

<400> 5
cacgaggaat gacatgaaag cagactgtat tttgtactac ggctttggag atatattcag 60
aataagttca atggtggtga tggaaaatgt gggacagcag aagctttatg agatggtatc 120
atactgtcaa aacataagca aatgtcgtcg tgtgttgatg gctcaacatt ttgatgaagt 180
atggaactca gaagcatgta acaaaatgtg cgrtaactgc tgtaaagaca gtgcatttga 240
aagaaagaac ataacagagt actgcagaga tctaatcaag atcctgaagc aggcagaggg 300
amctggaatg gaaaaactca ctcccattgg aaactggatt gattcttggr tgggaaaggg 360
tgcagcaaaa ctgagagtag caggtgttgt ggctcccaca cttcctcgtg aagatctgga 420
gaagattatt gcacacttts taatacagca gtatcttaaa gaagactaca gttttacagc 480
ttatgctacc atttcgtatt tgaaaatagg acctaaagct aatcttctga acaatgaggc 540
acatgctatt actatgcaag tgacaaagtc cacgcagaac tctttcaggg ctgaatcgtc 600
tcaaacttgt cattctgaac aaggtgataa aaagatggag gaaaaaaatt caggcaactt 660
ccagaagaag gctgcaaaca tgcttcagca atctggttct aagaatacag gagctaagaa 720
aagaaaaatc gatgatgcct gatatgaatg ttactaaatt ttctaattaa agatggttta 780
tgcatgtata tgccattatt tttgtagtta gacaatagtt tttaaaagaa tttcatagat 840
attttatatg tatggatcta tattttcaga gcttatctct gaagatctaa acttttgaga 900
atgtttgaaa attagagatc atgaattata taattttcca gtataaaaca agggaaaaat 960
ttttatgtaa aacccttaa atgtaaaata tttgagaata agttcataca atcgtcttaa 1020
gtttttttatg cctttatata cttagctata ttttttcttt tgacataact atctttttga 1080
aagcaatatt atactgacag aggctcactg agtgatactt taagttaaat atgtagatca 1140
aggatgtcca atcttttggc ttccctgagc cacattggaa gaagaattgt cttgggccgc 1200
acataaaata tgctaacact gatgatagct gatgagctta aaaaaaaaat tgcaagaaaa 1260
atctcatgtt ttaagaaagt ttacaaaaaa tgtaaaatat ttgagaataa gttcatgtaa 1320
ttgtcttaag ttttttatgc ctttatatac ttagctatat tttttctttt gacataacca 1380
tctttttgaa agcaatatta tactgacaga ggytcactga gtgatacttt aagttaaata 1440
tgtagatcag ggatgtccaa tcttttggct tccctgagcc acattggaag aagaattgtc 1500
ttgggccgca cataaaatat gctaacactg acgatagctg atgagcttaa aaaaaaaaaa 1560
attgcaagaa aaatctcatg ttttaagaaa gtttacagat ttgtgttggg ctgcattcaa 1620
agctgttctg ggctgcatta gacccgtggg ctagagttgg acaagcttgt agatgatttc 1680
aggttataaa accagaagta caattcaaca aaaaaggagt aagtcatcaa tataaatatt 1740
agcaaacgag atattgctac atctctattt aaagtaaaat acaaccgatt ttaaagttcc 1800
tgaaaccata gccatatttt gacatttcac aaagaatggt tctagtctac tagagtacat 1860
ttggctaagt agataactta cctaaatttg ctccaaagct aaatcacaag taaacatatt 1920
tatgtttaaa acacagaaat aaataactta agatttttat ctaagcggtc agtgttgtrt 1980
tggaaagata tatctataaa taaactttga actgatttca aacttaaaaa aaaaa 2035

<210> 6
<211> 1196
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (157)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (998)
<223> n equals a,t,g, or c

<400> 6
ggtgggtgtg ggactggggg ctgtgagtgt gagtgtgtgc aagagattgc tctgcatgtt 60
tgctgagggc tggagctggg cttttcagag atcgggcatc cctggtctct cagggccagt 120
tggaggttcc caggaggcat gttcttgatg cctgtgntgc ctgaatccaa ttaactgaat 180
tctgaagagt gcatggggta actgtctcag cctttctcct gtctctgcct ctgtcctctg 240
ctccaaatca taaaatctca gagctagaag cactttcaag atcattccat ccagcgcatt 300
caatttgcaa gtttaggcgt tgagttccag agagggatgg tagcttgctg aggtcccagt 360
caagcacact tgccattgcc tcagctttcc cctaaacacg gtgtctgtgg tcagggttgg 420
tgaggaggag ctttcctgtt ttgcctctcc ttcttcccat tggctacacc catctytggc 480
cctgctgata ccgattcccc tgacatttca ggctaaagcc agcaggraag ggctagggac 540
gggtgcctgg gaagcccaca tggagggagt tgggcaagat ttgattcgga gcaggtgtca 600
agacgtgttg gggaaactga ggcccagtgg aatagaagcc agtagaggag gaatctagag 660
gcctcctaga ttaaggcctg cctggaatgg attgggggtg ggtctttgga aaaggagggg 720
acccacctct agcccagtct ctcaactgcc cctcctttac agtgagtgag atcattggcc 780
gagacctgag tggcttccct gcacctcctg gagaagagcc tcctgcctga accacgtgaa 840
ctgtcatcac ctggcaaccc cagccccagc ctcagccctg ccccctttcc ctccttcctg 900
gagtggtggc tacagaagct tggggccaac cctggctcct ctttccccag cttctgtctg 960
tctcactgtc ttccctcccc tcccccagct gaggtgtngc cctcaggcct ggtgctgcct 1020
tggagggctg ggggaaggag tgtgtggagg agggaggagg gtgaagactg aggctaggtg 1080
ccagaatgga ctggagtgaa ggcgtgtcta gagtgtgggc tggctgttgt gctggaaagc 1140
tggggacagg ttgatggtaa taaactgctc aatgaccagt gaaaaaaaaa aaaaaa 1196

<210> 7
<211> 624
<212> DNA
<213> Homo sapiens

<400> 7
attattttca agtcaaaatt tccagtaagg atttacttta catttcattt ggataaatga 60
atcattatat aggtatgtct ttgcttccat tttgagacat ttagattttt acagcctgtt 120
tctatagcat ttgatgttac aactctaagc gtagttcaaa gacatttaaa ttgacaagtt 180
accagttaaa gaatttagaa tatattagat cccatctagt attatatatt ttttctagtt 240
gatcattgag cagtaaatac caaatactcg attagaaggt aatttttaca ttgttttgaa 300
agggtgaamc aatttatctc ctctggtatt attcttaaac cacagatagg gatagtaggg 360
tagtgaaacg mataaatacc tggtagaaga caagagactt gggctctaca cctggctctg 420
cactgatttg ctaagtcata ttggcaatca ccacaccctt cagggaatta gtttcatctg 480
taaaatgcag cggttagtac tatwaaatca tacmaatttc tttgtgcttt gagaatctwt 540
aarggaatgt ctgttgatat tctgagtcga ttttcatttg cttttgttcc agaacggtta 600
aaataaagca tattatttca ttta 624

<210> 8
<211> 301
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (289)
<223> n equals a,t,g, or c

<400> 8
aattcggcac gagcggcgac ggcggcggct ccaagatggc gcaggcgatc tttgaggccc 60
tggagggaat ggacaatcag accgttctgg ctgtccagtc attattggat ggccaaggag 120
cagtccctga tccgacaggc cagagtgtca atgcgccccc tgctatccag ccattggatg 180
acgaggatgt atttctctgc gggaagtgta agaagcaatt caactcgctg ccagcgttta 240
tgacccacaa gcgggaacag tgccagggga atgcccccgc cctggccana gtctcactgg 300
c 301

<210> 9
<211> 686
<212> DNA
<213> Homo sapiens

<400> 9
acccacgcgt ccgcccaact cctctttcgt ctttctttaa cacacactag gctctttgtg 60
tattatgatt cagtgctatt tgtaactgtg tcccagtgac caaattgcac tcgactcgat 120
cagctgttca tccatttcgt gttttttcct gtcaaacatt aatccagcaa atatatgagg 180
tatttaccaa tttattttct tagtattaca aaataattca ttagcataaa gtacaatagt 240
gaaatatttg agttgttcgg aacctcaatt aatcctgttt tacatttcag acctaaagct 300
ggcaatcagg agaagaagca ctttgtttta aatgtggaga agataacacc ttgattccat 360
ttcattgtca ttagtgtatt aaccagcagg agaggtgatg agccattttt caaatgaaat 420
acctttttatt tccatataat ttttttattt tagagttcaa tagctgtttc tatgattatc 480
ctcaatttcc atatgttact gaatctgaaa aacatcttta aaattcaaac agttccattt 540
tctctcttgt aagtgttaaa tgtgataaaa gtacatattt taaattgttt tcagctcttg 600
gatatagcag caataaaaac actaatttgt gggtatttaa gaaaacctgg agaataaact 660
catactttaa aagatcaaaa aaaaaa 686

<210> 10
<211> 397
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (379)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (394)
<223> n equals a,t,g, or c

<400> 10
cacacgctta gcaacctgga gtttgcccag aaagtggagc cctgcaacga ccacgtgaga 60
gccaagctgt cctgggctaa gaagagggat gaggatgacg tgcccactgt gccgtcgact 120
cygggcgagg agcgcctcta caacccccttc ctgcgggtgg cgtgagtatg gctgttgtcc 180
cggggcctcc accgttacgt ggacccttag gaaggcatct ggggactgcg tgttgggctg 240
agtgagcatc tctggcttgg gggaggctgc tcattaagtg cctgcctgcc cgsccamccc 300
tcggcgccat gctcccgcgt gggcagcggg ccctgcgcct cactgcaccc ctccctgcag 360
agaggagccg gtgcgcaant ttcacgggca aggnggt 397

<210> 11
<211> 563
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (10)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (13)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (37)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (510)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (562)
<223> n equals a,t,g, or c

<400> 11
aggcaaaacn gtnagaccga cagtaaccgg atccggnaat tcccgggtac gacccacgcg 60
tccggatata tcagagtaac tggagtagct gggatttact agtagtgtaa ataaaattca 120
ctcttcaata catgaatgga aacttaaatt ttttttttat gtgtccttgc ttatagttta 180
gctgtaataa tttaaccttg tattcttgtg ccatattctg tctttttatt acttataaag 240
acaaaccaaa gtaaatctga aggagacyag aagctttgaa attattgttt gggggtttta 300
taaaagcaac tactgtcacc tccatccaga ttcttttaaa ttattgatcc atccatagta 360
tatattgcta ctcattcaag aatcctcaat aagtattgag tatttaccat atgttgggat 420
actgtgggct ctggagagag gaggggggcaa tagagctagg rattaaggaa tcagttgwgt 480
aaaatgkgta atatttattc ccccattaan taactggact agggaaggga ctaaaaggcc 540
agaaaggggg atgaaaaaaa ant 563

<210> 12
<211> 443
<212> DNA
<213> Homo sapiens

<400> 12
gagacctcgg ctccggaatc actgcagccc ccctcgccct gagccagagc accccgggtc 60
ccgccagccc ctcacactcc cagcaaaatg ggcaaggaga agacccacat caacatcgtg 120
gtcatcggcc acgtggactc cggaaagtcc accaccacgg gccacctcat ctacaaatgc 180
ggaggtattg acaaaaggac cattgagaag ttcgagaagg aggcggctga gatggggaag 240
ggatccttca agtatgcctg ggtgctggac aagctgaagg cggasgtgag cgcgrrcatc 300
accatcgaca tctccctctg gaagttcgag accaccaagt actacatcac catcatcgat 360
gcccccggcc accgcgactt catcaagaac atgatcacgg gtacatccca ggcggactgc 420
gcagtgctga tcgtggcggc ggg 443

<210> 13
<211> 2438
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (117)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (681)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (713)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2413)
<223> n equals a,t,g, or c

<400> 13
cactgggagg gggtggggga tctgggcaag gtgggtgatt cctcccagga ggtgcttgag 60
gccccgatgg actcctgacc ataatcctag ccccgagaca ccatcctgag ccagggnaac 120
agccccaggg ttgggggggtg ccggcatctc ccctagctca ccaggcctgg cctctgggca 180
gtgtggcctc ttggctattt ctgtgtccag ttttggaggc tgagttctgg ttcatgcaga 240
caaagccctg tccttcagtc ttctagaaac agagacaaga aaggcagaca caccgcggcc 300
aggcacccat gtgggcgccc accctgggct ccacacagca gtgtcccctg ccccaraggt 360
cgcagctacc ctcagcctcc aatgcattgg cctctgtacc gcccggcagc cccttctggc 420
cggtgctggg ttcccactcc cggcctaggc acctccccgc tctccctgtc acgstcatgt 480
cctgtcctgg tcctgatgcc cgttgtctag gagacagagc caagcactgc tcacgtctct 540

gccgcctgcg tttggaggcc cctgggctct cacccagtcc ccacccgcct gcagagaggg 600
aactagggca ccccttgttt ctgttgttcc cgtgaatttt tttcgctatg ggaggcagcc 660
gaggcctggc caatgcggcc nactttcctg agctgtcgct gcctccatgg canagccarg 720
gacccccaga acaagaagac ccccccgcag atccctcctg agctcggggg gctctgcctt 780
ctcaggcccc gggcttccct tctccccagc cagaggtgga gccaagtggt ccagcgtcac 840
tccagtgctc agctgtggct ggaggagctg gcctgtggca cagccctgag tgtcccaagc 900
cgggagccaa cgaagccgga cacggcttca ctgaccagcg gctgctcaag ccgcaagctc 960
tcagcaagtg cccagtggag cctgccgccc ccrcctgggc accgggaccc cctcaccatc 1020
cagtgggccc ggagaaacct gatgaacagt ttggggactc aggaccagat gtccgtctct 1080
cttgcttgag gaatgaagac ctttattcac ccctgccccg ttgcttcccg ctgcacatgg 1140
acagacttca cagcgtctgc tcataggacc tgcatccttc ctggggacga attccactcg 1200
tccaagggac agcccacggt ctggaggccg aggaccacca gcaggcaggt ggactgactg 1260
tgttgggcaa gacctcttcc ctctgggcct gttctcttgg ctgcaaataa ggacagcagc 1320
tggtgcccca cctgcctggt gcattgctgt gtgaatccag gaggcagtgg acatcgtagg 1380
cagccacggc cccgggtcca ggagaagtgc tccctggagg cacgcaccac tgcttcccac 1440
tggggccggc ggggcccacg cacgacgtca gcctcttacc ttcccgcctc ggctaggggt 1500
cctcgggatg ccgttctgtt ccaacctcct gctctgggac gtggacatgc ctcaaggata 1560
cagggagccg gcggcctctc gacggcacgc acttgcctgt tggctgctgc ggctgtgggc 1620
gagcatgggg gctgccagcg tctgttgtgg aaagtagctg ctagtgaaat ggctggggcc 1680
gctggggtcc gtcttcacac tgcgcaggtc tcttctgggc gtctgagctg gggtgggagc 1740
tcctccgcag aaggttggtg gggggtccag tctgtgatcc ttggtgctgt gtgccccact 1800
ccagcctggg gaccccactt cagaaggtag gggccgtgtc ccgcggtgct gactgaggcc 1860
tgcttccccc tccccctcct gctgtgctgg aattccacag ggaccagggc caccgcaggg 1920
actgtctcag aagacttgat ttttccgtcc ctttttctcc acactccact gacaaacgtc 1980
cccagcggtt tccacttgtg ggcttcaggt gttttcaagc acaacccacc acaacaagca 2040
agtgcatttt cagtcgttgt gctttttgt tttgtgctaa cgtcttacta atttaaagat 2100
gctgtcggca ccatgtttat ttatttccag tggtcatgct cagccttgct gctctgcgtg 2160
gcgcaggtgc catgcctgct ccctgtctgt gtcccagcca cgcagggcca tccactgtga 2220
cgtcggccga ccaggctgga caccctctgc cgagtaatga cgtgtgtggc tgggaccttc 2280
tttattctgt gttaatggct aacctgttac actgggctgg gttgggtagg gtgttctggc 2340
ttttttgtgg ggtttttatt tttaaagaaa cactcaatca tcctaaaaaa aaaaaaaaaa 2400
aaaaaaaaaa ttnctcggtc cgcaagggaa ttcagtgg 2438

<210> 14
<211> 2347
<212> DNA
<213> Homo sapiens

<400> 14
aattcggcac gmgctgagga ccgcacggaa acggggaagt caggtggccg ctgccgccgc 60
cgccgccgcg gtttgtcgcc agaaggaaga tggcggatct ggaggagcag ttgtctgatg 120
aagagaaggt gcgtatagca gcaaaattca tcattcatgc ccctcctgga gaatttaatg 180
aggttttcaa tgatgttcgg ttactgctta ataatgacaa tcttctcagg gaaggagcag 240
cccatgcatt tgcacagtat aacttggacc agtttactcc agtaaaaatt gaaggttatg 300
aagatcaggt attgataaca gaacatggcg acttgggaaa tggaaagttt ttggatccaa 360
agaacagaat ctgttttaaa tttgatcact taaggaagga ggcaactgat ccaagaccct 420
gtgaagtaga aaatgcagtt gaatcatgga gaacttcagt agaaactgct ctgagagctt 480
acgtaaaaga acattacccg aatggagtct gcactgtgta tggcaaaaaa atagatggac 540
agcaaaccat tattgcatgc atagaaagcc atcagttcca agcaaaaaat ttttggaatg 600
gtcgttggag gtcagaatgg aagtttacaa tcactccttc aaccactcaa gtggttggca 660
tcttgaaaat tcaggttcat tattatgaag atggtaatgt tcagctagtg agtcataaag 720

atatacaaga ttccctaaca gtgtctaatg aagtgcaaac agcaaaagaa tttataaaga 780
ttgtagaagc tgcagaaaat gaataccaga ctgccatcag tgagaattat cagacaatgt 840
cggacactac tttcaaagcc ttacgtcgac agttgccagt tacacgcact aagattgatt 900
ggaacaagat ccttagctac aagattggca aagagatgca gaatgcataa gatgaacatt 960
gcatgaccgg atcattttag tgtctttgcg ttaaaaaatc attgcaaaag tattctgaac 1020
tgtcaagctg cccagtcaga tgggctgttg ccatttaaaa tcactgtaat taattagttt 1080
gattagagca caaagcttag ctaatcaacc attatttttc attttgtttg ttctaagagg 1140
attgaaaatc agtttagttt aaatgtcttt ctgttaggcc tttctttctt acaatgaaga 1200
gatgattctt ctagtttatg gttaaaagtt tttgaagtgt ctcaaaaata ttttactaac 1260
tgtaacccta aaattgatgt cttttggttt atgaaatcag taatttttga tatttcccca 1320
gttcttttta atggggtcaa taatggacat tctagtttaa ggtggttgat ggatttagcc 1380
atatatgctg ctaaagaaat tgtctacctt ttcttcctca cctgttccat ttatgtaaag 1440
ttgagattag agggaaagca ttttctatat caattgtgtt taaacctttc aagaaggtta 1500
tttagctagc ttagtgttga actaaatttt ttttaaacaa ggcaaggtct aatgctgttt 1560
tgagattctg aaattaatga aaatacttat ttcagaaatg catttaatgc ttttttttctt 1620
gtgacagtta cgcaaatcag cttgaattcc atatgtccct gagttatttt tatcataaag 1680
ccacaaatgt attataacaa ggcaaattgt aatatatata atcctgaact catgaccatg 1740
tctcggttta ttttttttt cttggattga aaagtactga aattcaatgt gacattaaaa 1800
tgcaaatttt cctatttatt tgagtagaaa atcacttacc agtgagcata tatattttaa 1860
aatactttct ttggatattg taattcttaa ctggttgtaa attagaaaag ctgggattac 1920
atatggtgtg cggttacagt ctaaattttt tcatcctcct atgcatcata agcatgtttg 1980
taatattttc aaaaatagtt ctactgatgc tacaggaatt tcaagcctgt ggtgaatgtt 2040
agtatttacc atagggagtg aagtggagtt atggtttcat tcaatagagt attgcygatt 2100
atacttgagt ggaatccttt cctcacgtac tcccacagac gtctgggcct ggaaattttt 2160
tttttatttt attttattgt ttttttttt agaaaaacac acttttatt atgtacaata 2220
aaatatttca ttagcttgaa ttgtatagat ttttaaaaat tcaatgaaag catgttgttt 2280
aatttctttt taaaatcact gttgggcttt gaaagcattg agaatataat atgaaattat 2340
gaaaaaa 2347

<210> 15
<211> 2006
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (862)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1006)
<223> n equals a,t,g, or c

<400> 15
ggcagagctg taccagtggc agcagcaagc cgaatagccc cagcatttcc ccttcaatac 60
ttagtaacac ggagcacaag aggggacctg aggtcacttc ccaaggggtt cagacttcca 120
gcccagcatg taaacaagag aaagacgata aggaagagaa gaaagacgca gctgagcaag 180
ttaggaaatc aacattgaat cccaatgcaa aggagttcaa cccacgttcc ttctctcagc 240
caaagccttc tactacccca acttcacctc ggcctcaagc acaacctagc ccatctatgg 300
tgggtcatca acagccaact ccagtttata ctcagcctgt ttgttttgca ccaaatatga 360

tgtatccagt cccagtgagc ccaggcgtgc aacctttata cccaatacct atgacgccca 420
tgccagtgaa tcaagccaag acatatagag caggtaaagt accaaatatg ccccaacagc 480
ggcaagacca gcatcatcag agtgccatga tgcacccagc gtcagcagcg ggcccaccga 540
ttgcagcmac cccaccagct tactccacgc aatatgttgc ctacagtcct cagcagttcc 600
caaatcagcc ccttgttcag catgtgccac attatcagtc tcagcatcct catgtctata 660
gtcctgtaat acagggtaat gctagaatga tggcaccacc aacacacgcc cagcctggtt 720
tagtatcttc ttcagcaact cagtacgggg ctcatgagca gacgcatgcg atgtatgcat 780
gtcccaaatt accatacaac aaggagacaa gcccttcttt ctactttgcc atttccacgg 840
gctcccttgc tcagcagtat gngcraccct aacgctaccc tgcacccaca tactccacac 900
cctcagcctt cagctacccc cactggacag cagcaaagcc aacatggtgg aagtcatcct 960
gcacccagtc ctgttcagca ccatcagcac caggccgccc aggctnctcc atctggccag 1020
tccacagcag cagtcagcca tttaccacgc ggggcttgcg ccaactccac cctccatgac 1080
acctgcctcc aacacgcagt cgccacagaa tagtttccca gcagcacaac agactgtytt 1140
tacgatccat ccttctcacg ttcagccggc gtataccaac ccaccccaca tggcccacgt 1200
acctcaggct catgtacagt caggaatggt tccttctcat ccaactgccc atgcgccaat 1260
gatgctaatg acgacacagc cacccggcgg tccccaggcc gccctcgctc aaagtgcact 1320
acagcccatt ccagtctcga caacagcgca tttcccctat atgacgcacc cttcagtaca 1380
agcccaccac caacagcagt tgtaaggctg ccctggagga accgaaaggc caaattccct 1440
cctcccttct actgcttcta ccaactggaa gcacagaaaa ctagaatttc atttattttg 1500
tttttaaaat atatatgttg atttcttgta acatccaata ggaatgctaa cagttcactt 1560
gcagtggaag atacttggac cgagtagagg catttaggaa cttgggggct attccataat 1620
tccatatgct gtttcagagt cccgcaggta ccccagctct gcttgccgaa actggaagtt 1680
atttattttt taataaccct tgaaagtcat gaacacatca gctagcaaaa gaagtaacaa 1740
gagtgattct tgctgctatt actgctaaaa aaaaaaaaaa aaaaaaatca agacttggaa 1800
cgccctttta ctaaacttga caaagtttca gtaaattctt accgtcaaac tgacggatta 1860
ttatttataa atcaagtttg atgaggtgat cactgtctac agtggttcaa cttttaagtt 1920
aagggaaaaa cttttacttt gtagataata taaaataaaa acttaaaaaa aatttaaaaa 1980
ataaaaaaag ttttaaaaac tgaaaa 2006

<210> 16
<211> 986
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (613)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (932)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (933)
<223> n equals a,t,g, or c

<220>
<221> misc feature

<222> (985)
<223> n equals a,t,g, or c

<400> 16
tcaaagtaac tcctgacctc aagccaacag aagcctcaag ttcggctttt cgcttgatgc 60
cagctcttgg cgtgagtgtg gctgaccaga agggaaaaag cacagtggcc tcttcagaag 120
caaaaccagc tgccacgatc cgcatcgtgc agggactggg agtgatgcct cccaaagcag 180
gccagaccat caccgttgca acccacgcca agcaaggggc ctcggtggcc agtgggtctg 240
gaactgtcca tacttcagcg gtgtccttac ccagtatgaa tgctgctgtg tccaagactg 300
tagctgtggc ttctggggct gcaagacccc catcagcatc agcacaggag cccccaccgt 360
gcggcaggtc cctgtcagca ccacggttgt gtccacgtcc caggctggga agttgcctac 420
acggatcaca gttcccctct ctgtgatcag ccagccaatg aagggcaaga gcgtggtcac 480
agcccccatc atcaaaggca accttggagc caacctcagt gggttgggcc gcaacatcat 540
cctcacaact atgccagcag gcactaagct cattgctggc aataagcctg ttagtttcct 600
cactgctcag canttgcagc agcttcagca gcaaggtcag gccacacagg tgcgcatcca 660
gactgtccct gcatcccatc tccaacaggg aacagcttct ggctcctcca aagcagtctc 720
cactgttgtt gtgactacag ctccgtctcc taaacaggca cctgagcaac aatgattatg 780
agagaggatg gcttccgtga aagaccatgc ctggtctgtc ctggctgaga agggaccagg 840
gagttgcatc attgttttaa gctgcctgtt caaggcagcc aggcgagggt gatggcaacg 900
gtggcctggt tygtgggcct ggattctgcg cnngggccat agtgggagca ccctgagaaa 960
ggtcactccc gggttccaaa ggctng 986

<210> 17
<211> 1589
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (25)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (555)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (809)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1033)
<223> n equals a,t,g, or c

<400> 17
tttgaacttg gggaaacaag gttgncatcc cagtggcctc aaccctccct cagcccctct 60
tgccccccac cccagcctaa gatgaagagg atcggaggct tgtcagagct gggaggggtt 120
ttcgaagctc agcccacccc cctcattttg gatataggtc agtgaaggcc cagggagagg 180

ccatgattcg cccaaagcca gacagcaacg gggaggccra gtgcaggctg gcaccgcctt 240
ctctaaatga ggggcctcag gtttgcctga gggcgagggg agggtggcag gtgaccttct 300
gggaaatggc ttgaagccaa gtcagctttg ccttccacgc tgtctccaga cccccacccc 360
ttccccactg cctgcccacc cgtggagatg ggatgcttgc ctagggcctg gtccatgatg 420
gagtcaggtt tggggttcgt ggaaagggtg ctgcttccct ctgcctgtcm ctctcaggca 480
tgcctgtktg acatcagtgg catggctcca gtctgctgcc ctccatcccg acatggaccc 540
ggagctaaca mtggnccccc agaatcagcc taggggtcag ggaccaagga cccctcamct 600
tgcaacacac agacacamgc acacacacac acaggaggag aaatctcact tttctccatg 660
agtttttttct cttgggctga gactggatac tgcccggggc agctgccaga gaagcatcgg 720
agggaattga ggtctgctcg gccgtcttca ctcgcccccg ggtttggcgg gccaaggact 780
gccgaccgag gctggagctg gcgtctgtnt tcaagggctt acacgtggag gaatgctccc 840
ccatcctccc cttccctgca aacatggggt tggctgggcc cagaaggttg tgatgaagaa 900
aagcgggcca gtgtgggaat gcggcaagaa ggaattgact tcgactgtga cctgtgggga 960
tttctcccag ctctagacaa ccctgcaaag gactgttttt tcctgagctt ggccagaagg 1020
gggccatgag gcntcagtgg actttccacc ccctccctgg cctgttctgt tttgcctgaa 1080
gttggaatga gtgtggctcc cctctattta gcatgacaag ccccaggcag gctgtgcgct 1140
gacaaccacc gctccccagc ccagggttcc cccagccctg tggaagggac taggagcact 1200
gtagtaaatg gcaattcttt gacctcaacc tgtgatgagg ggaggaaact cacctgctgg 1260
cccctcacct gggcacctgg ggagtgggac agagtctggg tgtatttatt ttcctcccca 1320
gcaggtgggg agggggtttg ggggcttgca agtatgtttt agcatgtgtt tggttctggg 1380
gccccttttt actccccttg agctgagatg gaacccttttt tgtgcccgag ctgggggcca 1440
tgagctccag acccccagca accctcctat cacctcccct ccttgcctcc tgtgtaatca 1500
tttcttgggc cctcctgaaa cttacacaca aaacgttaag tgatgaacat taaatagcaa 1560
agaaagaaaa ataaaaaaaa aaaaaaaaa 1589

<210> 18
<211> 846
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (746)
<223> n equals a,t,g, or c

<400> 18
gcacccgcct cgcccgtgat gccaccgcag acccagtccc ccgggcagcc ggcccagccc 60
gcgcccatgg tgccactgca ccagaagcag agccgcatca cccccatcca gaagccgcgg 120
ggcstcgacc ctgtggagat cctgcaggag cgcgagtaca ggctgcaggc tcgcatcgca 180
caccgaattc aggaacttga aaaccttccc gggtccctgg ccggggattt gcgaaccaaa 240
gcgaccattg agctcaaggc cctcaggctg ctgaacttcc agaggcagct gcgccaggag 300
gtggtggtgt gcatgcggag ggacacagcg ctggagacag ccctcaatgc taaggcctac 360
aagcgcasaa gcgccagtcc ctgcgcgagg cccgcatcac tgagaagctg gagaagcagc 420
agaagatcga gcaggagcgc aagcgccggc agaagcacca ggaatacctc aatagcattc 480
tccagcatgc caaggatttc aaggaatatc acagatccgt cacaggcaaa atccagaagc 540
tgaccaaggc agtggccacg taccatgcca acacggagcg ggagcagaag aaagagaacg 600
agcggatcga gaaggagcgc atgcggaggc tcatggctga agatgaggag gggtaccgca 660
agctcatcga ccagaagaag gacaagcgcc tggcctacct cttgcagcag acagacgagt 720
acgtggctaa ctcacggagc tggtgncggc acaaggctgc ccaggtcgcc aaggagaaaa 780
agaagaaaaa gaaaaagaag aaggcagaaa atgcagaagg acagacgcct gccattgggc 840
cggatg 846

<210> 19
<211> 2192
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (115)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2106)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2118)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2143)
<223> n equals a,t,g, or c

<400> 19
aaacaaaagg cgatattctg cctgggcaaa tctgtgacta atcttcctca agtcataaaa 60
caaaagctga cacctttata tgagctggta aaggaagtac cttgtgcctc tgtgnaaaaa 120
actatacctg aaatgggctc ttgaagagta tctggatgaa tttgacccct gtcattgccg 180
gccttgtcaa aatggtggtt tggctactgt tgaggggacc cattgtctgt gccattgcaa 240
accgtacaca tttggtgcgg cgtgtgagca aggagtcctc gtagggaatc aagcaggagg 300
ggttgatgga ggttggagtt gctggtcctc ttggagcccc tgtgtccaag ggaagaaaac 360
aagaagccgt gratgcaaka acccacctcc cagtgggggt gggagatcct gcgttggaga 420
aacgacagaa agcacacaat gcgaagatga ggagctggag cacttgaggt tgcttgaacc 480
acattgcttt cctttgtctt tggttccaac agaattctgt ccatcacctc ctgccttgaa 540
agatggattt gttcaagatg aaggtacaat gtttcctgtg gggaaaaatg tagtgtacwc 600
ttgcaatgaa ggatactctc ttattggaaa cccagtggcc agatgtggag aagatttacg 660
gtggcttgtt ggggaaatgc attgtcagaa aattgcctgt gttctacctg tactgatgga 720
tggcatacag agtcaccccc aaaaaccttt ctacacagtt ggtgagaagg tgactgtttc 780
ctgttcaggt ggcatgtcct tagaaggtcc ttcagcattt ctctgtggct ccagccttaa 840
gtggagtcct gagatgaaga atgcccgctg tgtacaaaaa gaaaatccgt taacacaggc 900
agtgcctaaa tgtcagcgct gggagaaact gcagaattca agatgtgttt gtaaaatgcc 960
ctacgaatgt ggaccttcct tggatgtatg tgctcaagat gagagaagca aaaggatact 1020
gcctctgaca gtttgcaaga tgcatgttct ccactgtcag ggtagaaatt acacccttac 1080
tggtagggac agctgtactc tgcctgcctc agctgagaaa gcttgtggtg cctgcccact 1140
gtggggaaaa tgtgatgctg agagcagcaa atgtgtctgc cgagaagcat cggagtgcga 1200
ggaagaaggg tttagcattt gtgtggaagt gaacggcaag gagcagacga tgtctgagtg 1260
tgaggcgggc gctctgagat gcagagggca gagcatctct gtcaccagca taaggccttg 1320
tgctgcggaa acccagtagg ctcctggagg ccmtggtcag cttgcttgga atccagcagg 1380
cagctggggc tgagtgaaaa catctgcaca actgggcact ggacagcttt tccttctcca 1440

gtgtctacct tcctcctcaa ctcccagcca tctgtataaa cacaatcctt tgttctccca 1500
aatctgaatc gaattactct tttgcctcct ttttaatgtc agtaaggata tgagcctttg 1560
cacaggctgg ctgcgtgttc ttgaaatagg tgttaccttc tctgggcctt ggtttttaa 1620
aatctgtaaa attagaggat tgcactagag aaacttgaat gctccattca ggcctatcat 1680
tttattaagt atgattgaca cagcccatgg gccagaacac actctacaaa atgactagga 1740
taacagaaag aacgtgatct cctgattaga gagggtggtt ttcctcaatg gaaccaaata 1800
taaagaggac ttgaacaaaa atgacagata caaactattt ctatcctgag tagtaatctc 1860
acacttcatc ctatagagtc aaccaccaca gataggratt ccttattctt tttttaattt 1920
ttttaagaca gagtctcact ttgttgccca ggytggagcg cagtggggtg atctcatctc 1980
cctgcaacct ccgcctcctg ggttcaagcg attcttgtgc ctcagcttcc caagcagctg 2040
gggattacag gtgcccgcca ccacgcccag ctaatttttg catttttagt agagatgggg 2100
tttcancatg ttggccangc tcgtctccaa ctcctgacct cangtaatcc gcctgccttg 2160
gcctcccaaa gtgctgggat acagacatga ac 2192

<210> 20
<211> 1011
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (54)
<223> n equals a,t,g, or c

<400> 20
ctctaatacg actcactata ggcaaagctg gtagcctgca gtaccggats crgnaattcc 60
cggggatgga agcgtttttg gggtcgcggt ccggactttg ggcggggggt ccggccccag 120
gacagtttta ccgcattccr tccactcccg attccttcat ggatccggcg tctgcacttt 180
acagaggtcc aatcacgcgg acccagaacc ccatggtgac cgggacctca gtcctcggcg 240
ttaagttcga gggcggagtg gtgattgccg cagacatgct gggatcctac ggctccttgg 300
ctcgtttccg caacatctct cgcattatgc gagtcaacaa cagtaccatg ctgggtgcct 360
ctggcgacta cgctgatttc cagtatttga agcaagttct cggccagatg gtgattgatg 420
aggagcttct gggagatgga cacagctata gtcctagagc tattcattca tggctgacca 480
gggccatgta cagccggcgc tcgaagatga acccttttgtg gaacaccatg gtcatcggag 540
gctatgctga tggagagagc ttcctcggtt atgtggacat gcttggtgta gcctatgaag 600
ccccttcgct ggccactggt tatggtgcat acttggctca gcctctgctg cgagaagttc 660
tggagaagca gccagtgcta agccagaccg aggcccgcga cttagtagaa cgctgcatgc 720
gagtgctgta ctaccgagat gcccgttctt acaaccggtt tcaaatcgcc actgtcaccg 780
aaaaaggtgt tgaaatagag ggaccattgt ctacagagac caactgggat attgcccaca 840
tgatcagtgg ctttgaatga aatacagatg cattatccag aactgaagtt gccctacttt 900
taactttgaa cttggctagt tcaaagatag actcttcttt tgtaaagtaa ataaattctt 960
caaaatgcaa aaaaaaaaaa aaaaaaaaaa cttcragact agttctctct c 1011

<210> 21
<211> 2019
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (2003)

<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2007)
<223> n equals a,t,g, or c

<400> 21
ggcagagccc aattcactcc cttccctcgc agtgactttc tcattctccc tgggtacatc 60
gacttcactg cagaccaggt ggacctgact tctgctctga ccaagaaaat cactcttaag 120
accccactgg tttcctctcc catggacaca gtcacagagg ctgggatggc catagcaatg 180
gcggtgagcc ccatggggtg tgggggaagg agcaaggact ccatcgcctt tccccaaagg 240
cattcagtcc tgcttctkgt cacttagtag tagtctcttt ttaatcctgt agcttacagg 300
cggtattggs ttcatccacc acaactgtac amctgaattc caggccaatg aagttyggaa 360
agtgaaggty wgaagggcaa cgatcattag caagcgctcc tgggaattgc actgaggtgg 420
ggtggggtgg gagtaggggt ttattctaat ttagtattct ttcttcccac catggggttc 480
agttactgag aagaccctga gattctgttt cttaaagcag cagcaataga ccaggtgtac 540
agtgcctcca gcctacccat gtctctaaga tgtgttggtg tgatttggtc ttgtggcact 600
gccaaaggga tcgataagca gagaccccat gcttcagatc aagagcctga tgaaagtagt 660
tcaaagatgc gatgcccttt ctcaccatcc ctttccagaa atatgaacag ggattcatca 720
cagaccctgt ggtcctcagc cccaaggatc gcgtgcggga tgtttttrag gccaaggccc 780
ggcatggttt ctgcggtatc ccaatcacag acacaggccg gatggggagc cgcttggtgg 840
gcatcatctc ctccagggac attgatttty tcaaagagga ggaacatgac tgtttcttgg 900
aagagataat gacaaagagg gaagacttgg tggtagcccc tgcaggcatc acactgaagg 960
aggcaaatga aattctgcag cgcacaagaa gggaaagttg cccattgtaa atgaagatga 1020
tgagcttgtg gccatcattg cccggacaga cctgaagaag aatcgggact acccactagc 1080
ctccaaagat gccaagaaac agctgctgtg tggggcagcc attggcactc atgaggatga 1140
caagtatagg ctggacttgc tcgcccaggc tggtgtggat gtagtggttt tggactcttc 1200
ccagggaaat tccatcttcc agatcaatat gatcaagtac atcaaagaca aataccctaa 1260
tctccaagtc attggaggca atgtggtcac tgctgcccag gccaagaacc tcattgatgc 1320
aggtgtggat gccctgcggg tgggcatggg aagtggctcc atctgcatta cgcaggaagt 1380
gctggcctgt gggcggcccc aagcaacagc agtgtacaag gtgtcagagt atgcacggcg 1440
ctttggtgtt ccggtcattg ctgatggagg aatccaaaat gtgggtcata ttgcgaaagc 1500
cttggccctt ggggctccac agtcatgatg ggctctctcc tggctgccac cactgaggcc 1560
cctggtgaat acttcttttc cgatgggatc cggctaaaga aatatcgcgg tatgggttct 1620
ctcgatgcca tggacaagca cctcagcagc cagaacagat atttcagtga agctgacaaa 1680
atcaaagtgg cccagggagt gtctggtgct gtgcaggaca aagggtcaat ccacaaattt 1740
gtcccttacc tgattgctgg catccaacac tcatgccagg acattggtgc caagagcttg 1800
acccaagtcc gagccatgat gtactctggg gagcttaagt ttgagaagag aacgtcctca 1860
gcccaggtgg aaggtggcgt ccatagcctc cattcgtatg agaagcggct tttctgaaaa 1920
gggatccagc acacctcctc ggtttttttt tcaataaaag tttagaaaga aaaaaaaaaa 1980
aaaaaaaaat tctcgggggg ggncccngta cccaattgg 2019

<210> 22
<211> 2022
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1588)

<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1615)
<223> n equals a,t,g, or c

<400> 22
gctttctggc gggcgctggg agaagacgga cctcacctac aggatccttc ggttcccatg 60
gcagttggtg caggagcagg tgcggcagac gatggcagag gccctaaagg tatggagcga 120
tgtgacgcca ctcaccttta ctgaggtgca cgagggccgt gctgacatca tgatcgactt 180
cgccaggtac tgcatggggg acgacctgcc gtttgatggg cctggggcat cctggcccat 240
gccttcttcc ccaagactca ccgagaaggg gatgtccact tcgactatga tgagacctgg 300
actatcgggg atgaccaggg cacagacctg ctgcaggtgg casccatgaa tttggccacg 360
tgctggggct gcagcacaca acagcagcca aggccctgat gtccgccttc tacacctttc 420
gctacccact gagtctcagc ccagatgact gcaggggcgt tcaacaccta tatggccagc 480
cctggccact gtcacctcca ggaccccagc cctgggcccc caggctggga tagacaccaa 540
tgagattgca ccgctggagc cagacgcccc gccagatgcc tgtgaggcct cctttgacgc 600
ggtctccacc atccgaggcg agctcttttt cttcaaagcg ggctttgtgt ggcgcctccg 660
tgggggccag ctgcagcccg gctacccagc attggcctct cgccactggc agggactgcc 720
cagccctgtg gacgctgcct tcgaggatgc ccagggccac atttggttct tccaaggtgc 780
tcagtactgg gtgtacgacg gtgaaaagcc agtcctgggc cccgcacccc tcaccgagct 840
gggcctggtg aggttcccgg tccatgctgc cttggtctgg ggtcccgaga agaacaagat 900
ctacttcttc cgaggcaggg actactggcg tttccacccc agcacccggc gtgtagacag 960
tcccgtgccc cgcaggccac tgactggaga ggggtgccct ctgagatcga cgctgccttc 1020
caggatgctg atggctatgc ctacttcctg cgcggccgcc tctactggaa gtttgaccct 1080
gtgaaggtga aggctctgga aggcttcccc cgtctcgtgg gtcctgactt ctttggctgt 1140
gcgagcctgc caacactttc ctctgaccat ggcttggatg ccctcagggg tgctgacccc 1200
tgccaggcca cgaatatcag gctagagacc catggccatc tttgtggctg tgggcaccag 1260
gcatgggact gagcccatgt ctcctcaggg ggatggggtg gggtacaacc accatgacaa 1320
ctgccgggag ggccacgcag gtcgtggtca cctgccagcg actgtctcag actgggcagg 1380
gaggctttgg catgacttaa gaggaagggc agtcttgggc ccgctatgca ggtcctgggc 1440
aaacctggct gccctgtctc catccctgtc cctcagggta gcaccatggc aggactgggg 1500
gaactggagt gtccttgctg tatccctgtt gtgaggttcc ttccaggggc tggcactgaa 1560
gcaagggtgc tggggcccca tggccttnca gccctggctg agcaactggg ctgtnagggc 1620
agggccactt cctgaggtca ggtcttggta ggtgcctgca tctgtctgcc ttctggctga 1680
caatcctgga aatctgttct ccagaatcca ggccaaaaag ttcacagtca aatggggagg 1740
ggtattcttc atgcaggaga ccccaggccc tggaggctgc aacatacctc aatcctgtcc 1800
caggccggat cctcctgaag ccctttcgc agcactgcta tcctccaaag ccattgtaaa 1860
tgtgtgtaca gtgtgtataa accttcttct tctttttttt ttttaaactg aggattgtca 1920
ttaaacacag ttgttttcta aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1980
aaaaaaaaaa aaaaagggcg gccgctcgcg atctagaact ag 2022

<210> 23
<211> 1126
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1126)

<223> n equals a,t,g, or c

<400> 23
cccttcccca ctgcacacac ctcagaggct gttcttgggg ccctacacct tgaggagggg 60
caggtaaact cctgtccttt acacattcgg ctccctggag cagactctgg tcttctttgg 120
gtaaacgtgt gacgggggaa agccaaggtc tggagaagct cccaggaaca ayygatggcc 180
ttgcagcact cacacaggac ccccttcccc tacccccctcc tctctgccgc aatacaggaa 240
cccccagggg aaagatgagc ttttctaggc tacaattttc tcccaggaag ctttgatttt 300
taccgtttct tccctgtatt ttctttctct actttgagga aaccaaagta acctttttgca 360
cctgctctct tgtaatgata tagccagaaa aacgtgttgc cttgaaccac ttccctcatc 420
tctcctccaa gacactgtgg acttggtcac cagctcctcc cttgttctct aagttccact 480
gagctccatg tgcccccctct accatttgca gagtcctgca cagttttctg gctggagcct 540
agaacaggcc tcccaagttt taggacaaac agctcagttc tagtctctct ggggccacac 600
agaaactctt tttgggctcc tttttctccc tctggatcaa agtaggcagg accatgggac 660
caggtcttgg agctgagcct ctcacctgta ctcttccgaa aaatcctctt cctctgaggc 720
tggatcctag ccttatcctc tgatctccat ggcttcctcc tccctcctgc cgactcctgg 780
gttgagctgt tgcctcagtc ccccaacaga tgcttttctg tctctgcctc cctcaccctg 840
agccccttcc ttgctctgca cccccatatg gtcatagccc agatcagctc ctaaccctta 900
tcaccagctg cctcttctgt gggtgaccca ggtccttgtt tgctgttgat ttctttccag 960
aggggttgag cagggatcct ggtttcaatg acggttggaa atagaaattt ccagagaaga 1020
gagtattggg tagatatttt ttctgaatac aaagtgatgt gtttaaatac tgcaattaaa 1080
gtgatactga aacacaaaaa aaaaaaaaaa aaaaaaaaaa aaaaan 1126

<210> 24
<211> 2598
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (2304)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2500)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2533)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2553)
<223> n equals a,t,g, or c

<400> 24
ggcacagctt gtttttccaa gcagctgttt ggctttccra agcccacttt ctgtctttaa 60
raggtttaaa garactacca gaccattttc caatgaatgt cttggtacca ccagacccgt 120

agttcctatt gattcatcag attttgcatt ggatattcgc atgcctgggg ttacacctaa 180
acagtccgat acatacttct gcatgtctat gcgaatacca gtggatgagg aagccttcgt 240
gattgacttc aagcctcgag ccagcatgga tactgtccat cacatgttac tttttggatg 300
caatatgcct tcatccactg graattactg gttttgtgat gaaggaacct gtacagataa 360
agccaatatt ctgtatgcct gggcgagaaa tgctcccccct acccggctcc ccaaaggtgt 420
tggattcaga gttggaggag agactggaag taaatacttt gtactacagg tacactatgg 480
ggatattagt gcttttagag ataataacaa ggactgttct ggtgtgtcct tacacctcac 540
acgtctgcca cagcctttaa ttgctggcat gtaccttatg atgtctgttg acactgttat 600
cccagcagga gaaaaagtgg tgaattctga catttcatgc cattrtwaaa attatccaat 660
gcatgtcttt gcctatagag ttcacactca ccatttaggt aaggtagtaa gtggatacag 720
agtaagaaat ggacagtgga cactgattgg acggcagagc cctcagctgc cacaggcttt 780
ctaccctgtg gggcatccag ttgatgtaag ttttggtgac ctactggctg caagatgtgt 840
attcactggt gaaggaagga cagaagccac acacattggt ggcacgtcta gtgatgaaat 900
gtgcacttat acattatgta ttacatggaa gccaagcatg cagtttcttt catgacctgt 960
acccagaatg tagctccaga tatgttcaga accataccac cagaggccaa cattccaatt 1020
cccgtgaagt ctgatatggt tatgatgcat gaacatcata aagaaacaga atataaagat 1080
aagattcctt tactacagca gccaaaacga gaagaagaag aagtgttaga ccagggtgat 1140
ttctattcac tactttccaa gctgctagga gaaagggaag atgttgttca tgtgcacaaa 1200
tataatccta cagaaaaggc agaatcagag tcagacctgg tagctgagat tgcaaatgta 1260
gtccaaaaaa aggatcttgg tcgatctgat gccagagagg gtgcagaaca tgagaggggt 1320
aatgctattc ttgtcagaga cagaattcac aaattccaca gactagtatc taccttgagg 1380
ccaccagaga gcagagtttt ctcattacag cagcccccac ctggtgaagg cacctgggaa 1440
ccagaacaca caggagattt ccacatggaa gaggcactgg attggcctgg agtatacttg 1500
ttaccaggcm aggtttctgg ggtggctcta gamcctaaga ataacctggt gattttccac 1560
agaggtgacc atgtctggga tggaaactcg tttgacagca agtttgttta ccagcaaata 1620
ggactcggac caattgaaga agacactatt cttgtcatag atccaaataa tgctgcagta 1680
ctccagtcca gtggaaaaaa tctgttttac ttgccacatg gcttgagtat agataaagat 1740
gggaattatt gggtcacaga cgtggctctc catcaggtgt tcaaactgga tccaaacaat 1800
aaagaaggcc ctgtattaat cctgggaagg agcatgcaac caggcagtga ccagaatcac 1860
ttctgtcaac ccactgatgt ggctgtggat ccaggcactg gagccattta tgtatcagat 1920
ggttactgca acagcaggat tgtgcagttt tcaccaagtg gaaagttcat cacacagtgg 1980
ggagaagagt cttcagggag cagtcctctg ccaggccagt tcactgttcc tcacagcttg 2040
gctcttgtgc ctcttttggg ccaattatgt gtggcagacc gggaaaatgg tcggatccag 2100
tgttttaaaa ctgacaccaa agaatttgtg agagagatta agcattcatc atttggaaga 2160
aatgtatttg caatttcata tataccaggc ttgctctttg cagtgaatgg gaagcctcat 2220
tttggggacc aagaacctgt acaaggattt gtgatgaact tttccaatgg ggaaattatm 2280
gacatcttca agccagtgcg caanctttttg gatatgcctc atgatattgt tgcatctgaa 2340
gatgggactg tgtacattgg gagatgctca taccaacacc gtgtgggaag ttccaccttg 2400
gactkgagaa awttgggaac atcggtycag tttaaaaaag ggctggscat tgaggtccag 2460
ggaaatccaa agaagcccga gggcatttgt tgtttccccn ttacaaccct tcgggttatt 2520
ccggtggttg gtnncctggcg gggccatggc ccnaatttaa ttccggtggg aaaaaatccc 2580
aggggccctt tgggaaga 2598

<210> 25
<211> 411
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (358)

<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (368)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (381)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (387)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (392)
<223> n equals a,t,g, or c

<400> 25
gcggccgagc tgcagcccgg gctcagtctc cgccgccgcc gtgaacatgg agcccccgga 60
cgcaccggcc caggcgcgcg gggccccgcg gctgctgttg ctcgcagtcc tgctggcggc 120
gcacccagat gcccaggcgg aggtgcgctt gtctgtaccc ccgctggtgg aggtgatgcg 180
aggaaagtct gtcattctgg actgcacccc tacgggaacc cacgaccatt atatgctgga 240
atggttcctt accgaccgct cgggagctcg cccccgccta gcctcggctg agatgcaggg 300
ctctgagctc caggtcacaa tgcacgacac ccggggccgc agtcccccat accagctngg 360
actyccangg ggcgcctggt ngctggnytg anggcccark tggcgacgag c 411

<210> 26
<211> 657
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (634)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (652)
<223> n equals a,t,g, or c

<400> 26
aactgaagaa ttttgagtga attagacctt tatttttcta tctggttgga tggtggcttt 60
aggggaaggg ggaaaggtgt aggctggggg attgaggtgg ggaatcattt tagctggtgt 120
cagcccctct tcccttcctc cattgcacat gaacatatgt ccatccatat atattcatca 180
gaatgttaat ttattttgct ccctctgtta ggtccatttt ctaagggtag aagaggcaag 240

tggtagggat gaggtctgat aagaacccag ggtggagagg gagactcctg ggcagccgtt 300
ttcctcatcc tttccctctc ccagtccatt tccaaatgtg gcctccatgt gggtgctagg 360
gacatgggaa aaaccactgc tatgccattt cttctctctg ttcccttcct caccccccgac 420
ggtgtggctg atgatgtctt ctggtgtcat ggtgaccacc ccctgttccc tgttctggta 480
tttcccctgt cagtttcccc tctcggccag gttgtgtccc aaaatccccct cagcctcttc 540
tctgcacgtt gctgaaggtc caggcttgcc tcaagttcca tgcttgagca ataaagtgga 600
aacaataaaa cctgggaaaa aaaaaaaagg gggncgttct aaaggatccc cnagggg 657

<210> 27
<211> 1903
<212> DNA
<213> Homo sapiens

<400> 27
gggcacggga ctcgtgccga ttcggcagag cacaaagttt gactccagtc tggatcgcaa 60
ggacaaattc tcctttgacc tgggaaaagg ggaggtcatc aaggcttggg acattgccat 120
agccaccatg aaggtggggg aggtgtgcca catcacctgc aaaccagaat atgcctacgg 180
ttcagcaggc agtcctccaa agattccccc caatgccacg cttgtatttg aggtggagtt 240
gtttgagttt aagggagaag atctgacgga agaggaagat ggcggaatca ttcgcagaat 300
acagactcgc ggtgaaggct atgctaagcc caatgagggt gctatcgtgg aggttgcact 360
ggaagggtac tacaaggaca agctctttga ccagcgggag ctccgctttg agattggcga 420
gggggagaac ctggatctgc cttatggtct ggagagggcc attcagcgca tggagaaagg 480
agaacattcc atcgtgtacc tcaagcccag ctatgctttt ggcagtgttg ggaaggaaaa 540
gttccaaatc ccaccaaatg ctgagctgaa atatgaatta cacctcaaga gttttgaaaa 600
ggccaaggag tcttgggaga tgaattcaga agagaagctg gaacagagca ccatagtgaa 660
agagcggggc actgtgtact tcaaggaagg taaatacaag caagctttac tacagtataa 720
gaagatcgtg tcttggctgg aatatgagtc tagtttttcc aatgaggaag cacagaaagc 780
acaggccctt cgactggcct ctcacctcaa cctggccatg tgtcatctga aactacaggc 840
cttctctgct gccattgaaa gctgtaacaa ggccctagaa ctggacagca acaacgagaa 900
gggcctcttc cgccggggag aggcccacct ggccgtgaat gactttgaac tggcacgggc 960
tgatttccag aaggtcctgc agctctaccc caacaacaaa gccgccaaga cccagctggc 1020
tgtgtgccag cagcggatcc gaaggcagct tgcccgggag aagaagctct atgccaatat 1080
gtttgagagg ctggctgagg aggagaacaa ggccaaggca gaggcttcct caggagacca 1140
tcccactgac acagagatga aggaggagca gaagagcaac acggcaggga gccagtctca 1200
ggtggagaca gaagcatagc ccctctccac cagccctact cctgcggctg cctgcccccc 1260
agtctcccca ctccaccctg ttagttttgt aaaaactgaa gaattttgag tgaattagac 1320
ctttattttt ctatctggtt ggatggtggc tttaggggaa gggggaaagg tgtaggctgg 1380
gggattgagg tggggaatca ttttagctgg tgtcagcccc tcttcccttc ctccattgca 1440
catgaacata tgtccatcca tatatattca tcagaatgtt aatttatttt gctccctctg 1500
ttaggtccat tttctaaggg tagaagaggc aagtggtagg gatgaggtct gataagaacc 1560
cagggtggag agggagactc ctgggcagcc gttttcctca tcctttccct ctcccagtcc 1620
atttccaaat gtggcctcca tgtgggtgct agggacatgg gaaaaaccac tgctatgcca 1680
tttcttctct ctgttccctt cctcaccccg acgtgtggcc ctaaggctgt gccacctccc 1740
cctgcccagt ccctggtctc tgtacagtgt ctgtccagga cgtctatcca tccatccttg 1800
acaacctgtc cagatgaggc cactgttatc ccagtctgtg aggggcgatc acagcccagg 1860
tgccggccga tgtggagacg ctgatggact tcagtgtgca gga 1903

<210> 28
<211> 1333
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1311)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1313)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1319)
<223> n equals a,t,g, or c

<400> 28
ggccgctagt gcccagctcg cagaaggcgc tgctgctgga gctcaagggg ctgcaggaag 60
agccggtcga gggattccgc gtgacactgg tggacgaggg cgatctatac aactgggagg 120
tggccatctt cgggcccccc aacacctact acgagggcgg ctacttcaag gcgcgcctca 180
agttccccat cgactaccca tactctccac cagcctttcg gttcctgacc aagatgtggc 240
accctaacat ctacgagacg ggggacgtgt gtatctccat cctccacccg ccggtggacg 300
acccccagag cggggagctg ccctcagaga ggtggaaccc cacgcagaac gtcaggacca 360
ttctcctgag tgtgatctcc ctcctgaacg agcccaacac cttctcgccc gcaaacgtgg 420
acgcctccgt gatgtacagg aagtggaaag agagcaaggg gaaggatcgg gagtacacag 480
acatcatccg gaagcaggtc ctggggacaa ggtggacgcg ggtgaacggc gtgaaggtgc 540
ccaccacgct ggccgagtac tgcgtgaaga ccaaggcgcc ggcgcccgac gagggttcag 600
acctcttcta cgacgactac tacgaggacg gcgaggtgga ggaggaggcc gacagctgct 660
tcggggacga tgaggatgac tctggcacgg aggagtcctg acaccaccag aataaacttg 720
ccgagtttac ctcactaggg ccggacccgt ggctccttag acgacagact acctcacgga 780
ggttttgtgc tggtccccgt ctcctctggt tgtttcgttt tggcttttc tccctcccca 840
tgtctgttct gggttttcac gtgcttcaga gaagaggggc tgccccaccg ccactcacgt 900
cactcggggc tcggtggacg ggcccagggt gggagckgcc ggcccacctg tcccctcggg 960
aggggagctg agcccgactt ctaccggggt cccccagctt ccggactggc cgcaccccgg 1020
aggagccacg ggggcgctgc tgggaacgtg ggcgggggggc cgtttcctga cactaccagc 1080
ctgggaggcc caggtgtagc ggtccgaggg gcccggtcct gcctgtcagc tccaggtcct 1140
ggagccacgt ccagcacaga gtggacggat tcaccgtggc cgactctttt ccctgctttg 1200
gtttgtttga aatctaaata aaactacttt atgagaaaaa aaaaaaaaaa aaaaaaaaaa 1260
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa nanaaaaana 1320
aaaaaaaaaa ttt 1333

<210> 29
<211> 1327
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (573)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1307)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1325)
<223> n equals a,t,g, or c

<400> 29
cttgttctcc gccgccgccg cccgccgccg ccgccrccgc cgcygccgct gccatggctc 60
aatacaaggg cgccgcgagc gaggccggcc gcgccatgca cctgatgaag aagcgggaga 120
agcagcgcga gcagatggag cagatgaagc agcgcatcgs ggaggagaac atcatgaaat 180
ccaacattga caagaagttc tctgcgcact acgacgcggt ggaggcagag ctcaagtcca 240
gcaccgtggg tctcgtgacc ctgaatgaca tgaaggccaa gcaggaggct ctggtgaagg 300
agcgggagaa gcagctggcc aagaaggagc agtccaagga gctgcagatg aagctggaga 360
agcttcgaga gaaggagcgt aagaaggaag ccaagcggaa gatctccagc ctgtccttca 420
ccctggagga ggaagaagag ggaggcgagg aggaagagga ggcggccatg tatgaggagg 480
agatggaaag ggaagagatc accacgaaga agagaaaact ggggaagaac ccagacgttg 540
acacaagctt cttgcctgat cgagaccgtg agnaggagga gaatcggctt cgggaagagc 600
tgcggcagga gtgggaagcc aagcaggaga agatcaagag tgaggagatc gagatcacct 660
tcagctactg ggatggctct gggcaccggc ggacagtcaa gatgagaaag ggcaacacca 720
tgcagcagtt cctgcagaag gcgctcgaga tccttcggaa agacttcagt gagctgaggt 780
ccgcagggkt ggagcagctc atgtacatca aggaggactt gatcatccct caccatcaca 840
gcttctacga cttcatcgtc accaaggcac gggggaagag tggaccactc ttcaactttg 900
atgttcatga cgatgtgcgg ttgctcagtg acgccactgt ggagaaggat gagtcccatg 960
caggcaaggt ggtgctgagg agctggtacg agaagaacaa gcacatcttt cccgccagcc 1020
gctgggaacc ctacgaccct gaaaagaagt gggacaagta cacgatccgc tgagcatcca 1080
ggaggctgcg cggccccggc tcctcagctc cctcagtgtg ccccgtggtg tcaccgggac 1140
tccaggcacc cgctcccctg cgaccatgcc aggcacgctg ggaggaggac ggcagctgct 1200
cgtgtcctgc ccctgccaca tcagtgactg ctttattctt ttccaataaa gaagtgcacg 1260
tgtcagagct ggagcgcctg cattgtgaga aaaaaaaaag gaggggnaag aaaaaaaaaa 1320
agggngg 1327

<210> 30
<211> 709
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (696)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (701)
<223> n equals a,t,g, or c

<400> 30

aattcccggg ttcgacccac gcgtccggaa aactgcagct tccttctcac cttgaagaat 60
aatcctagaa aactcacaaa atgtgtgatg cttttgtagg tacctggaaa cttgtctcca 120
gtgaaaactt tgatgattat atgaaagaag taggagtggg ctttgccacc aggaaagtgg 180
ctggcatggc caaacctaac atgatcatca gtgtgaatgg ggatgtgatc accattaaat 240
ctgaaagtac ctttaaaaat actgagattt ccttcatact gggccaggaa tttgacgaag 300
cactgcagat gacaggaaag tcaagagcac cataacctta gatgggggtg tcctggtaca 360
tgtgcagaaa tgggatggaa aatcaaccac cataaagaga aaacgagagg atgataaact 420
ggtggtggaa tgcgtcatga aaggcgtcac ttccacgaga gtttatgaga gagcataagc 480
caagggacgt tgacctggac tgaagttcgc attgaactct acaacattct gtgggatata 540
ttgttcaaaa agatattgtt gttttccatg atttagcaag caactaattt tctcccaagc 600
tgattttatt caatatggtt acgttggtta aataaacttt ttttagattt aaaaaaaaaa 660
aaaaaaaacc ycgggggggg gcccggtacc caattngccc nttaggggg 709

<210> 31
<211> 1108
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (389)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (397)
<223> n equals a,t,g, or c

<400> 31
tgcttatcct tgtgctgatg tttgtggtat ggatgaaacg ccgggataaa gaacgccagg 60
ccaaacaact tttaattgat ccagaagatg atgtaagaga taatatttta aaatatgatg 120
aagaaggtgg aggagaagaa gaccaggact atgacttgag ccagctgcag cagcctgaca 180
ctgtggagcc tgatgccatc aagcctgtgg gaatcygacg aatggatgaa agacccatcc 240
acgccgagcc ccagtatccg gtccgatctg cagccccaca ccctggagac attggggact 300
tcattaatga gggccttaaa gcggctgaca atgaccccac agctccacca tatgactccc 360
tgttagtgtt tgactatgaa ggcagtggnt ccactgntgg gtccttgagc tcccttaatt 420
cctcaagtag tggtggtgag caggactatg attacctgaa cgactggggg ccacggttca 480
agaaacttgc tgacatgtat ggtggaggtg atgactgaac ttcagggtga acttggtttt 540
tggacaagta caaacaattt caactgatat tcccaaaaag cattcagaag ctaggcttta 600
actttgtagt ctactagcac agtgcttgct ggaggctttg gcataggctg caaaccaatt 660
tgggctcaga gggaatatca gtgatccata ctgtttggaa aaacactgag ctcagttaca 720
cttgaatttt acagtacaga agcactggga ttttatgtgc ctttttgtac ctttttcaga 780
ttggaattag ttttctgttt aaggctttaa tggtactgat ttctgaaacg ataagtaaaa 840
gacaaaatat tttgtggtgg gagcagtaag ttaaaccatg atatgcttca acacgctttt 900
gttacattgc atttgctttt attaaaatac aaaattaaac aaamaaaaaa actcatggag 960
cgattttatt atcttggggg atgagaccat gagattggaa aatgtacatt acttctagtt 1020
ttagacttta gtttgttttt ttttttttt cactaaaatc ttaaaactta ctcagctggt 1080
tgcaaataaa gggagttttc atatcacc 1108

<210> 32
<211> 526

<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (502)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (524)
<223> n equals a,t,g, or c

<400> 32
gaatttttca ttatgttgct tttgaaattt gatgcattcc tcccatttac tttattattg 60
tacacattta acacacagta gcaaattttg aacgatgtga ttgatataac ctaacaaatc 120
tgagccagtt attattagag ttgcagaata gaaacttgaa gtgctaaatg gaataatcca 180
aaggaaattt tttaaatgca ggttctagct gaaaaattca actataagaa aattgtattt 240
atataacatt tactattttt gaagactagt gagatttctg taataatttt aattctttaa 300
aaagtgaaag cttgttgtaa agatattttc tttttgttat tagaaggaaa tacaaagaga 360
aaaatttctt tctttcatgg ggcatttgat aatttcagtc tttgacgatt tgtaagccta 420
gaatatacta agctgaataa cagctctttg gcctcagaat tttccagtag ccagtawttc 480
yggattaact aagttggaaa cncytattag gaacctccag tggnga 526

<210> 33
<211> 555
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (494)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (521)
<223> n equals a,t,g, or c

<400> 33
ccggaccctg cacccagcga ctgggccccg cgcgcgccct ccgcgagggt ggaggcggcg 60
gctgtgtgcg cagggcccgg caccggactg ggaccctggc gtcctccag gccttgcctc 120
ctgcgggags acagtttggc ttcacttctc tgaccccagc ctcggccgta aagtgaaaga 180
gaccggacca gcttcagctt tcggactctg gttcttggat cgtgtcctct ccccctcgcc 240
gccctcttcc cccaatctga gccattkcag gcctctgcct gckgcccccc ctctcctcgg 300
gatcgggtcc ccagagccac catctcctga gcctcccacc ccgctgcctg ggccctgtgg 360
ttgctgggcc tcccacctca aggaggggaa ggttgtacag cccgaacccg tggagcaatg 420
ccctgtctgg cctccaaaac caaaataaaa ctgggtcact ttacaaaaaa aaaaaaaaaa 480
aagggcccgg gaanaccgga ccggtacctg caggcgtacc ngtttcccta tagtgagttg 540
tattagcgtt gcata 555

<210> 34
<211> 347
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (288)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (328)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (335)
<223> n equals a,t,g, or c

<400> 34
gggtcgaccc acgcgtccgg accgcgcggc tagtggtgtg aggatctgag ccccgtggtg 60
gggggtggag gcggctcctg cratctaaag ggacttgaga ctctcaccgg ccgcgcgcca 120
tgagggccct gtgggtgctg ggcctctcct gcrtcctgct gaccttcggg tcggtccgar 180
ctgaygatga agtcgatgtg gatggtacag tggaagagga tctgggtaaa agtagagaag 240
gttcaaggac agatgatgaa gtagtacaga gagaggaaga agctattnca gttggatgga 300
ttaaatgcat cccaaataag agaacttnag agagnaagtc cagaaaa 347

<210> 35
<211> 750
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (701)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (731)
<223> n equals a,t,g, or c

<400> 35
gggtggcttc cttgtggttc ctcagtggtg cctgcaaccc ctggttcacc tccttccagg 60
ttctggctcc ttccagccat ggctctcaga gtccttctgt taacagcctt gaccttatgt 120
catgggttca acttggacac tgaaaacgca atgaccttcc aagagaacgc aaggggcttc 180
gggcagagcg tggtccagct tcagggatcc agggtggtgg ttggagcccc ccaggagata 240
gtggctgcca accaaagggg cagcctctac cagtgcgact acagcacagg ctcatgcgag 300
cccatccacc tgcaggtccc cgtggaggcc gtgaacatgt ccctgggcct gtccctggca 360
gccaccacca gccccctca gctgctggcc tgtggtccca ccgtgcacca gacttgcagt 420

gagaacacgt atgtgaaagg gctctgcttc ctgtttggat ccaacctacg gcagcagccc 480
cagaagttcc cagaggccct ccgagggtgt cctcaagarg atagtgacat tgccttcttg 540
attgatggct ctggtagcat catcccacat gactttcggc ggatgaagga rtttgtctca 600
actgtgatgg agcaattaaa aaagtccaaa accttgttct ctttgatgca gtactctgaa 660
gaattccgga ttcactttac ttcaaagagt tccagaacaa ncctaaccca agatcactgg 720
tgaagccaat nacgcagctg cttggggcgg 750

<210> 36
<211> 1291
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (29)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (298)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (695)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (795)
<223> n equals a,t,g, or c

<400> 36
aagaaaaatg tactacgcct gtcctgtang aagctgaaga tttttgcaat gcccatgcag 60
gatatcaaga tgatcctgaa aatggtgcag ctggactcta ttgaagattt gggaagtgac 120
ttgtacctgg aagctaccca ccttggcgaa attttctcct tacctgggcc agatgattaa 180
tctgcgtaga ctcctcctct cccacatcca tgcatcttcc tacatttccc cggagaagga 240
agagcagtat atcgcccagt tcacctctca gttcctcagt ctgcagtgcc tgcagctnct 300
ctatgtggac tctttatttt tccttagagg ccgcctggat cagttgctca ggcacgtgat 360
gaaccccttg gaaaccctct caataactaa ctgccggctt tcggaagggg atgtgatgca 420
tctgtcccag agtcccagcg tcagtcagct aagtgtcctg agtctaagtg gggtcatgct 480
gaccgatgta agtcccgagc ccctccaagc tctgctggag agagcctctg ccaccctcca 540
ggacctggtc tttgatgagt gtgggatcac ggatgatcag ctccttgccc tcctgccttc 600
cctgagccac tgctcccagc ttacaacctt aagcttctac gggaattcca tctccatatc 660
tgccttgcag agtctcctgc agcacctcat cgggntgagc aatctgaccc acgtgctgta 720
tcctgtcccc ctggagagtt atgaggacat ccatggtamc ctccamctgg agaggttgct 780
atctgcatgc caggntcagg gagttgctgt gtgarttggg gcggcccagc atggttctgg 840
cttagtgggc aacccctgtc ctcactgtgg ggacagaacc ttctatgacc cggagcccat 900
cctgtgcccc tgtttcatgc ctaatarctg ggtgcacata tcaaatgctt cattctgcat 960
acttggacac taaagccagg atgtgcatgc atcttgaagc aacaaagcag ccacagtttc 1020
agacaaatgt tcagtgtgag tgaggaaaac atgttcagtg aggaaaaaac attcagacaa 1080

atgttcagtg aggaaaaaaa ggggagttgg ggataggcag atgttgactt grggagktaa 1140
tgtgatcttt ggggagatac atcttataga gttagaaata gaatctgaat ttctaaaggg 1200
agawtctggc ttgggaagta catgtaggag ttaatccctg tgtagactgt tgtaaagaaa 1260
ctgttgaaaa taaagagaag caatgtgaag c 1291

<210> 37
<211> 1535
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1413)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1526)
<223> n equals a,t,g, or c

<400> 37
ggcacgaggg tacgcagagc ttcgtcttcc agcgcgaaga gatagcgcag ttggcgcggc 60
agtacgctgg gctggaccac gagctggcct tctctcgtct gatcgtggag ctgcggcggc 120
tgcacccagg ccacgtgctg cccgacgagg agctgcagtg ggtgttcgtg aatgcgggtg 180
gctggatggg cgccatgtgc cttctgcacg cctcgctgtc cgagtatgtg ctgctcttcg 240
gcaccgcctt gggctcccgc ggccactcgg ggcgctactg ggctgagatc tcggatacca 300
tcatctctgg caccttccac cagtggagag agggcaccac caaaagtgag gtcttctacc 360
caggggagac ggtagtacac gggcctggtg aggcaacagc tgtggagtgg gggccaaaca 420
catggatggt ggagtacggc cggggcgtca tcccatccac cctggccttc gcgctggccg 480
acactgtctt cagcacccag gacttcctca ccctcttcta tactcttcgc tcctatgctc 540
ggggcctccg gcttgagctc accacctacc tctttggcca ggacccttga ccagccaggc 600
ctgaaggaag acctgcggat ggacaggagc gggcaggccc gcacatatcc acttgctgga 660
gcccatgttt acagacaggg acatacacca tgcagatcct gagttcctgc tgtatgagca 720
gggatatcca tgcttatgta tccaaacaca gagacccatg ggaacaaatg agacacatat 780
agatactgag acctgtgtgt acagtaggac catgcactca cacccatctg gagagggagc 840
ccccggtata ccaagggagc cagttgtgtt cagacacaca catcacagct tgactcacta 900
actgaggcct ttccatagct ccacagcttc ccacctcctc cccaccaaac cggggttcta 960
gagttaagga tgggggaggg tattatactg cctcagtctg actcctcaac ccagcagcaa 1020
tttgagggga tgagggggaa gaggagctgc cttttggagg ccccccttcac ctgcagctat 1080
gatgcccttc cccttctccc ctgtcctcac catatgcctt atccccattc tactcccctg 1140
ctatgcaagt gcccctgtgg cttgtcccca acccccctcag caacaaagct cagctgggga 1200
acgagagtaa tttgaagaat gcttgaagtc agcgtcttcc attccagaaa gacccccatt 1260
cttcctttgg gggtatgatg tggaagctgg tttcagccca ggacccacca ctgaggagag 1320
gatctagaca ggtgggccta attccaaggg gcccttcctg gcctggagaa ggccttttac 1380
acacacacaa cacatacaca cacacacaca canacacata tcacagtttt cacacagccc 1440
ctgctgcatt ctctgtccat ctgtctgttt ctattaataa agatttgttg atctgttcca 1500
aaaaaaaaaa aaaaaaaaaa aaaaangggg gggct 1535

<210> 38
<211> 295
<212> DNA

<213> Homo sapiens

<400> 38
ctggtcacac tattacatgc catgcaggca cgcgataaaa cgctggggct ggcaacactg 60
tgcattggcg gcggtcaggg aattgcgatg gtgattgaac ggttgaatta atcaataaaa 120
acacccgata gcgaaagtta tcgggtgttt tcttgaacat cgacggcgaa ggtaacccca 180
ttaatcacca gtcaaaactt ttcaccagcg tcactcgcca gcattacgca tcggtacaat 240
aaatgtttcc tgtttctcat tgaccgatcc ttcatcggtg atcagcgtca ttggg 295

<210> 39
<211> 1300
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (641)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1297)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1298)
<223> n equals a,t,g, or c

<400> 39
gcggactggc aggggcagg gaagctcaaa gatctggggt gctgccagga aaaagcaaat 60
tctggaagtt aatggttttg agtgattttt aaatccttgc tggcggagag gcccgcctct 120
ccccggtatc agcgcttcct cattctttga atccgcggct ccgcggtctt cggcgtcaga 180
ccagccggag gaagcctgtt tgcaatttaa gcgggctgtg aacgcccagg gccggcgggg 240
gcggggccga ggcgggccat tttraataaa gaggcgtgcc ttccaggcag gctctataag 300
traccgccgc ggcgagcgtg cgcgckttgc aggtcactgt agcgggactt cttttggttt 360
tctttctctt tggggcacct ctggactcac tccccagcat gaaggcgctg agcccggtgc 420
gcggctgcta cgaggcggtg tgctgcctgt cggaacgcag tctggccatc gcccggggcc 480
gagggaaggg cccggcagct gaggagccgc tgagcttgct ggacgacatg aaccactgct 540
actcccgcct gcggraactg gtacccggag tcccgagagg cactcagctt agccaggtgg 600
aaatcctaca gcgcgtcatc gactacattc tcgacctgca ngtagtcctg gccgagccag 660
cccctggacc ccctgatggc ccccaccttc ccatccagac agccgagctc gctccggaac 720
ttgtcatctc caacgacaaa aggagctttt gccactgact cggccgtgtc ctgacacctc 780
cagaacgcag gtgctggcgc ccgttctgcc tgggaccccg ggaacctctc ctgccggaag 840
ccggacggca gggatgggcc ccaacttcgc cctgcccact tgacttcacc aaatcccttc 900
ctggagacta aacctggtgc tcaggagcga aggactgtga acttgtggcc tgaagagcca 960
gagctagctc tggccaccag ctgggcgacg tcaccctgct cccaccccac ccccaagttc 1020
taaggtctyt tcagagcgtg gaggtgtgga aggagtggct gctctccaaa ctatgccaag 1080
gcggcggcag agctggtctt ctggtctcct tggagaaagg ttctgttgcc ctgatttatg 1140
aactctataa tagagtatat aggttttgta ccttttttac aggaaggtga ctttctgtaa 1200
caatgcgatg tatattaaac tttttataaa agttaacatt ttgcataata aacgattttt 1260

aaacaaaaaa aaaaaaaaaa aaggggggcc gccctanngg 1300

<210> 40
<211> 215
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (210)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (213)
<223> n equals a,t,g, or c

<400> 40
cagaaacaga agttcacact aacagagtat ggttttaatt ttcctttgaa tgaaaaggat 60
agaaagataa aattgtgtat tgttaacatg taaataaaat tggagctaat ttgaaactag 120
cttctcaata acttcatctt tctagagact cattacctgt gggcttgtcm aacctggact 180
atttggccaa atwggttgga taaaaaaggn atntt 215

<210> 41
<211> 474
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (85)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (216)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (374)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (449)
<223> n equals a,t,g, or c

<400> 41
tcgacccacg cgtccgggag actacggtaa aggcgcgcgc acgcagccaa catgccggtg 60
gcccggagct gggtttgtcg caagnctacg tgacccctcg gaggcccttt gagaagtcgc 120

ggctcgacca agagctgaag ctgataggcg agtacgggct ccggaacaaa cgtgaggtgt 180
ggagggtcaa gttcaccctg gccaagatcc gcaagnccgc gcgggarctg ctgacgctgg 240
acgagaagga cccgcggcgc ctgtttgagg gcaatgcctt gcttcggcga ctggtgcgca 300
ttggagtgct ggacgagggc aagatgaagc tggattatat cctgggtctg aagatgagga 360
ttcttggaga grcntctgca gacccaggty tttcaagctg gggttggcca atccatccac 420
catgccctgt gctgatccgc caggccacnc aggtccgaaa gcaagtggtg aaca 474

<210> 42
<211> 425
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (375)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (403)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (418)
<223> n equals a,t,g, or c

<400> 42
cctcgccttc gatgaatatg ggcgcccttt cctcatcatc aaggatcagg atcgcaagtc 60
tcgtcttatg ggactggagc tctcaagtct catatcatgg cggcaaaggc tgtagcaaat 120
accatgagaa catcacttgg accaaatgga cttgataaaa tgatggtgga caaggacggc 180
gacgtgacgg tcacaaacga cggtgccacg attctgagca tgatggatgt cgatcaccag 240
attgccaagc tgatggtgga gctgtccaaa tcccaggatg atgaaatcgg agatggggac 300
cacgggggtg gttgtcctgg ccggcgccct gctggaagga ggccgagcag ctgctggacc 360
gcggcattca mccgntcagg atcgccgacg gttacgagca ggntgcccgc attggccntc 420
gagca 425

<210> 43
<211> 1187
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (33)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (41)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1149)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1156)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1160)
<223> n equals a,t,g, or c

<400> 43
tgtgggaact ggtgggtccc ccgggctggc agnaattggg nacgcgggtc gcggttcttg 60
tttgtggatc gctgtgatcg tcacttgaca atgcagatct tcgtgaagac tctgactggt 120
aagaccatca ccctcgaggt tgagcccagt gacaccatcg agaatgtcaa ggcaaagatc 180
caagataagg aaggcatccc tcctgaccag cagaggctga tctttgctgg aaaacagctg 240
gaagatggkc gcaccctgtc tgactacaac atccagaaag agtccaccyt gcacctggtr 300
ctccgtctca gaggtgggat gcaaatcttc gtgaagacac tcactggcaa gaccatcacc 360
cttgaggtcg agcccagtga cacyatcgag aacgtcaaag caaagatcca rgacaaggaa 420
ggcattcctc ctgaccagca gaggttgatc tttgccggaa agcagctgga agatgggcgc 480
accctgtctg actacaacat ccagaaagag tctaccctgc acctggtgct ccgtctcaga 540
ggtgggatgc agatcttcgt gaagaccctg actggtaaga ccatcacyct cgargtggag 600
ccgagtgaca ccattgagaa tgtcaaggca aagatccaag acaaggaagg catccctcct 660
gaccagcaga ggttgatctt tgctgggaaa cagctggaag atggacgcac cctgtctgac 720
tacaacatcc agaaagagtc caccctgcac ctggtgctcc gtcttagagg tgggatgcag 780
atcttcgtga agaccctgac tggtaagacc atcactctcg aagtggagcc gagtgacacc 840
attgagaatg tcaaggcaaa gatccaagac aaggaaggca tccctcctga ccagcagagg 900
ttgatctttg ctgggaaaca gctggaagat ggacgcaccc tgtctgacta caacatccag 960
aaagagtcca ccctgcacct ggtgctccgt ctyagaggtg ggatgcagat cttcgtgaag 1020
accctgactg gtaagaccat cacyctcgaa gtggagccga gtgacaccat ygagaatgtc 1080
aaggcaagat ccagacaagg aaggcatcct cctgaccagc agargttgat tttgctggga 1140
aaarcttgna aatggncgan ccctttttgat taaaatcccg aaagttc 1187

<210> 44
<211> 515
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (217)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (465)

<223> n equals a,t,g, or c

<400> 44
ctgcagtacc gtccgaattc ccgggtcgac ccacgcgtcc ggtttgagcc gtcgtgcttc 60
accggtctac ctcgctagca tgtcgggccg cggcaagact ggcggcaagg cccgcgccaa 120
ggccaagtcg cgctcgtcgc gcgccggcct ccagttccca gtgggccgtg tacaccggct 180
gctgcggaag ggccactacg ccgagcgcgt tggcgcnggc rcgccagtgt acctggcggc 240
agtgctggag tacctcaccg ctgagatcct ggagctggcg ggcaatgcgg cccgcgacaa 300
caagaagacg cgaatcatcc cccgccacct gcagctggcc atccgcaacg acgaggagct 360
caacaagctg ctgggcggcg tgacgatcgc ccagggaagg cgtyctgccc aacatccagg 420
ccgtgsttgy tgcccaagaa gaccagcgcc accgtggggc cgaangccct tcgggggggca 480
agaaagggca accaaggctt cccaaggagt actaa 515

<210> 45
<211> 1499
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1476)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1492)
<223> n equals a,t,g, or c

<400> 45
gcgagtgcgc gctcctcctc gcccgccgct aggtccatcc cggcccagcc accatgtcca 60
tccacttcag ctccccggca tccgcgaggt caccattaac cagagcctgc tggccccgct 120
gcggctggac gccgaccccct ccctccagcg ggtgcgccag gaggagagcg agcagatcaa 180
gaccctcaac aacaagtttg cctccttcat cgacaaggtg cggtttctgg agcagcagaa 240
caagctgctg gagaccaagt ggacgctgct gcaggagcag aagtcggcca agagcagccg 300
cctcccagac atctttgagg cccagattgc tggccttcgg ggtcagcttg aggcactgca 360
ggtggatggg ggccgcctgg aggcggagct gcggagcatg caggatgtgg tggaggactt 420
caagaataag tacgaagatg aaattaaccg ccgcacagct gctgagaatg agtttgtggt 480
gctgaagaag gatgtggatg ctgcctacat gagcaaggtg gagctggagg ccaaggtgga 540
tgccctgaat gatgagatca acttcctcag gaccctcaat gagacggagt tgacagagct 600
gcagtcccag atctccgaca catctgtggt gctgtccatg gacaacagtc gctccctgga 660
cctggacggc atcatcgctg aggtcaaggc rcagtatgag gagatggcca aatgcagccg 720
ggctgaggct gaagcctggt accagaccaa gtttgagacc ctccaggccc aggctgggaa 780
gcatggggac gacctccgga atacccggaa tgagatttca gagatgaacc gggccatcca 840
gaggctgcag gctgagatcg acaacatcaa gaaccagcgt gccaagttgg aggccgccat 900
tgccgaggct gaggagcgtg gggagctggc gctcaaggat gctcgtgcca agcaggagga 960
gctggaagcc gccctgcagc gggccaagca ggatatggca cggcagctgc gtgagtacca 1020
ggaactcatg agcgtgaagc tggccctgga catcgagatc gccacctacc gcaagctgct 1080
ggagggcgag gagagccggt tggctggaga tggagtggga gccgtgaata tctctgtgat 1140
gaattccact ggtggcagta gcagtggcgg tggcattggg ctgaccctcg ggggaaccat 1200
gggcagcaat gccctgagct tctccagcag tgcgggtcct gggctcctga aggcttattc 1260
catccggacc gcatccgcca gtcgcaggag tgcccgcgac tgagccgcct cccaccactc 1320

cactcctcca gccaccaccc acaatcacaa gaagattccc acccctgcct cccatgcctg 1380
gtcccaagac agtgagacag tctggaaagt gatgtcagaa tagcttccaa taaagcagcs 1440
tcattctgag gcctgagtga aaaaaaaaaa aaaaanaaaa aaaaaaattt tnggggggg 1499

<210> 46
<211> 393
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (167)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (178)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (219)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (359)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (372)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (378)
<223> n equals a,t,g, or c

<400> 46
tcgacccacg cgtccggcag cctttctgag ggagcggttg tgtgttcgcc atcttaggaa 60
gaagatgttc tcgtccgtgg cgcatctggc cgggcgaacc ccttcaacgc gccccacctg 120
cagctggtac acgatggcct cacgggcacc gaagcagccc cgtgggnacc cccgggcncg 180
ccccgaacgt tcccgcaatc tggcagcagc cgctgtggna agagtacagt tgcgaatatg 240
gctccatgaa gttttatgca ctgtgtggct ttggtggggt cttaagttgt ggtctgacac 300
acactgctgt cgttcctctg gatttagtga aatgccgaat gcargtggac ccccagaant 360
acaagggcak wnttaatngg attctcatta aca 393

<210> 47
<211> 238
<212> DNA

<213> Homo sapiens

<400> 47
cggatcccgg ctcctgcatc cagtcgccat tcgggaggcc gctgcgctgc agggcctcgc 60
ggaccgcccg cgaccgcgag ccgggccctc cgcgcggtcc atcgcccact ggacgccgcc 120
cgcggccgga ccggttcaac ttctcatctt tgttcttctt catatactat aggctgtttg 180
ctgtggttta gtcaaaaagc catgtagaat gcctgccttt tgaagaccac ttttaagg 238

<210> 48
<211> 939
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (937)
<223> n equals a,t,g, or c

<400> 48
gccaccatct tggaacggga ggcggagcag agtcgactgg gagcgaccga gcgggccgcc 60
gccgccgcca tgaaccccga atatgactac ctgtttaagc tgcttttgat tggcgactca 120
ggcgtgggca agtcatgcct gctcctgcgg tttgctgatg acacgtacac agagagctac 180
atcagcacca tcggggtgga cttcaagatc cgaaccatcg agctggatgg caaaactatc 240
aaacttcaga tctgggacac agcgggccag gaacggttcc ggaccatcac ttccagctac 300
taccgggggg ctcatggcat catcgtggtg tatgacgtca ctgaccagga atcctacgcc 360
aacgtgaagc agtggctgca ggagattgac cgctatgcca gcgagaacgt caataagctc 420
ctggtgggca acaagagcga cctcaccacc aagaaggtgg tggacaacac cacagccaag 480
gagtttgcag actctctggg catccccttc ttggagacga gcgccaagaa tgccaccaat 540
gtcgagcagg cgttcatgac catggctgct gaaatcaaaa agcggatggg gcctggagca 600
gcctctgggg gcgagcggcc caatctcaag atcgacagca cccctgtaaa gccggctggc 660
ggtggctgtt gctagsaggg gcacatggag tgggacagga gggggcacct tctccagatg 720
atgtccctgg agggggcagg aggtacctcc ctctccctct cctggggcat ttgagtctgt 780
ggctttgggg tgtcctgggc tccccatctc cttctggccc atctgcctgc tgccctgagc 840
cccggttctk tmagggtccc taaaggagga cactcagggc ctgtggcagg cagggcggag 900
gctgcttgtg ctgttgcctc taagtgaatt tccaaangc 939

<210> 49
<211> 1771
<212> DNA
<213> Homo sapiens

<400> 49
tctgaggctc ctggggagtc ggtgggaacg acaccagaag ctcagatgaa gactggccca 60
tttgcagagc actccaacca gctgtggaac atcagcgccg tcccttcctg gtccaaagtg 120
aaccagggtc tcatccgcat gtataaggcc gagtgcctgg agaagttccc tgtgatccag 180
cacttcaagt tcgggagcct gctgcccatc catcctgtca cgtcgggcta ggaggggcca 240
agccgaagag ccacccaggc cacagttcct gtgcctgcct tccccacccc agcagtggcc 300
cctccccatc ccctcccctct gttcgtcccg tttgatgaga ggctgtttac tggggtgggg 360
tggcgagatg ggcttgaggg ggctcagagc ataaggcttc agggcccaag ttgggagaag 420
tgaccaaagt gtagccagtt ttctgagttc ccgtgtgcta gactggccag aagagagggt 480
ctggggcctg gtcactcggc cactctctcc tgtttctggc ctcttctccc ttcactcccg 540

tccagtctgg ttttgagagc aggggctgtt ctgcagcacc kcagggaagg gaggagagat 600
acctgctgct tccattgctt ttcccttcct ggagtcgatg cctttctaag ggttggagct 660
gctccttgca ggggcgggtc agtttcccag gccatgccgg ggtggccatc tatgctaggg 720
ctggaagctg aggctggccg ccagctgtgg gctggggtgg ggtgggtggg gtcgggtggt 780
ggagaggcct tagctgtcct ggctggtgcc cctcccaggc tccttttcac cctgcccccc 840
gggcctgagg ccccctgtgt ccaagcctcc ccctggctct tcagttctct agcccttggc 900
tttgctgggt ttcctgactg tagccacatc tctcccgctc cctaagggta acctagccaa 960
tggaagctgc cctttgggta ggtgctgggc tcctgggagg gcccagatga tggggtgagg 1020
catgtctttc cagaactttc cctggcaggg aggggatggc agaaactcag ggaggggctt 1080
ggggcccatt gtatctggag agcctggatt cctcttggca gtcttaggcc crgccacttc 1140
tgctaccttt gcgctgctgt gagcctcacc ctgggccccc gggccctgct tctctgctcc 1200
cctgggtgat gggtgggccc agaaggtggc agtcccacac cttgtcctcc cacctccctg 1260
aactgtccat tgcttttata gggtgaggta agwgacagcc tcccaagccc aggctttggc 1320
actcagaatg ggcccagtgg gggctgggca ggcccattga gggccaccgc cgaggtttct 1380
cctagggctg ttcctgggcc tggctcttac aggctcgtcc cccaggcctg cccttctcca 1440
ctgccccctc ctgtgtctgg gtccacacac ccttcaggaa gggggagcac tgagaagcac 1500
agcacagggg ctcagcctgg gatccggtga tggtctgggc agaggctggg tcaggagtcc 1560
caaaggtcag tgacagtttc tcagaagagg cccagcgtcc acctctctcc cagggccaga 1620
caccccttcc tggctccccc atccccctat ggctcccagc cccttgcacc ctcattgctg 1680
ttcagattaa agcctctgtt ttgcacctgt aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1740
aaaaaaaaaa aaaaaaaaaa aaaaaaattt t 1771

<210> 50
<211> 397
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (201)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (207)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (352)
<223> n equals a,t,g, or c

<400> 50
gggtcgaccc acgcgtccgc tcgctccggg atcgcccgcg ctagagacgc atagcgctct 60
aatcgctcgc acgcaccggc cctcgctcgc tcgcccgtcc gtgccgccgc cgcccagccc 120
accgccaccc tttgcagcca tgtccaccag gtcygtgtcc tcgtcytcct accgcagatg 180
ttcggcggcc ccggcaccgg nagcggnccg agctccacgc gcataacgtg accagtccac 240
ccgcacctac agcctgggca gcgcctgcgc cccagcacca gccgcagcct ctamamctcg 300
tccccgggcg gcgcgtatgt tcacggctcc ttccgcggtg cgcctgcgga anatgttgcc 360
ccggcgttgc gcttgctggc aggattccgt ggaattt 397

<210> 51
<211> 1635
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1422)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1617)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1620)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1629)
<223> n equals a,t,g, or c

<400> 51
gcccacgcgt ccgcccacgc gtccgcccac gcgtccgcct ctccagccct tctcctgtgt 60
gcctgcctcc tgccgccgcc accatgacca cctccatccg ccagttcacc tcctccagct 120
ccatcaaggg ctcctccggc ctgggggcg gctcgtcccg cacctcctgc cggctgtctg 180
gcggcctggg tgccggctcc tgcaggctgg gatctgctgg cggcctgggc agcaccctcg 240
ggggtagcag ctactccagc tgctacagct ttggctctgg tggtggctat ggcagcagct 300
ttgggggtgt tgatgggctg ctggctggag gtgagaaggc caccatgcag aacctcaatg 360
accgcctggc ctcctacctg gacaaggtgc gtgccctgga ggaggccaac actgagctgg 420
aggtgaagat ccgtgactgg taccagaggc aggccccggg gcccgcccgt gactacagcc 480
agtactacag gacaattgag gagctgcaga acaagatcct cacagccacc gtggacaatg 540
ccaacatcct gctacagatt gacaatgccc gtctggctgc tgatgacttc cgcaccaagt 600
ttgagacaga gcaggccctg cgcctgagtg tggaggccga catcaatggc ctgcgcaggg 660
tgctggatga gctgaccctg gccagagccg acctggagat gcagattgag aacctcaagg 720
aggagctggc ctacctgaag aagaaccacg aggaggagat gaacgccctg cgaggccagg 780
tgggtggtga gatcaatgtg gagatggacg ctgccccagg cgtggacctg agccgcatcc 840
tcaacgagat gcgtgaccag tatgagaaga tggcagagaa gaaccgcaag gatgccgagg 900
attggttctt cagcaagaca gaggaactga accgcgaggt ggccaccaac agtgagctgg 960
tgcagagtgg caagagtgag atctcggagc tccggcgcac catgcaggcc ttggagatag 1020
agctgcagtc ccagctcagc atgaaagcat ccctggaggg caacctggcg gagacagaga 1080
accgctactg cgtgcagctg tcccagatcc aggggctgat tggcagcgtg gaggagcagc 1140
tggcccagct tcgctgcgag atggagcagc agaaccagga atacaaaatc ctgctggatg 1200
tgaagacgcg gctggagcag gagattgcca cctaccgccg cctgctggag ggagaggatg 1260
cccacctgac tcagtacaag aaagaaccgg tgaccacccg tcaggtgcgt accattgtgg 1320
aagaggtcca ggatggcaag gtcatctcct cccgcgagca ggtccaccag accacccgct 1380
gaggactcag ctaccccggc cggccaccca ggaggcaggg angcagccgc cccatctgcc 1440
ccacagtctc cggcctctcc agcctcagcc ccctgcttca gtcccttccc catgcttcct 1500

tgcctgatga caataaagct tgttgactca gctaaaaaaa aaaaaaaaaa aaaaaaaaaa 1560
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaanttn 1620
ggggggggnc ccccc 1635

<210> 52
<211> 1780
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1780)
<223> n equals a,t,g, or c

<400> 52
ccgccgccgc cgccgccgcc ggagctctgt agtatggcat cgaggagaat ggagaccaaa 60
cctgtgataa cctgtctcaa aaccctcctc atcatctact ccttcgtctt ctggatcact 120
ggggtgatcc tgctggctgt tggagtctgg ggcaaactta ctctgggcac ctatatctcc 180
cttattgccg agaactccac aaatgctccc tatgtgctca tcggaactgg caccactatt 240
gttgtctttg gcctgtttgg atgctttgct acatgtcgtg gtagcccatg gatgctgaaa 300
ctgtatgcca tgtttctgtc cctggtgttc ctggctgagc tcgtagctgg catttcaggg 360
tttgtgtttc gtcatgagat caaggacacc ttcctgagga cttacacgga cgctatgcag 420
acttacaatg gcaatgatga gaggagccgg gcagtggacc atgtgcagcg casctgagct 480
gctgtggtgt gcagaactac accaactgga gcaccagccc ctacttcctg gagcatggca 540
tccccccag ctgctgcatg aacgaaactg attgtaatcc ccaggatcta cacaatctga 600
ctgtggccgc caccaaagtt aaccagaagg gttgttatga tctggtaact agtttcatgg 660
agactaacat gggaatcatc gctggagtgg cgtttggaat cgcattctcc cagttaattg 720
gcatgctgct ggcctgctgt ctgtcccggt tcatcacggc caatcagtat gagatggtgt 780
aaggagaagt ctttcaagaa tgacggaata agagacctgt tttaaaaagg aactgcagca 840
atctttgaaa gacttccaaa gaatgttaga gcacagtaca taatacactt gccctgctcc 900
ctctmcccct taccccacaa cgtgcaactg acactcccac ccagtctctg ctccaccttt 960
cagcccacgt cacgtgtagt gtccattttg tgaagccctg ttgtgccaca gagtgtagcc 1020
aggtcccccc gcagctagtc ctagtgaacc tcaccccgag gccctgcatg ggcmrgcccc 1080
tccatctgta cttggtccaa ctgcaactca tcatcggtga ctggttatca caccatcgct 1140
ggccccctttg ggccctgcat gtagtgtggg aggctcctgt tagctcctca ctgtggtaaa 1200
tgccacacac ctttaagtag ataagcagac gatagttatc tgttcttttg acttaatctc 1260
atttggtttg attttccctc tactaaggct ttcctacctt cttcaggctg cctaagacat 1320
gtaacgaaac acttcaataa ttgtccatga ggagaaaaaa agcatgtgtc atgcatgaag 1380
gaaactgaac ttgaggtggc ctccttgctt gttacatacc tgggtatgtg taggcagttt 1440
agtgcatctt tgcctctcag ttgaaacctg tataaccctg ttacaaagct gtgttgttgc 1500
ttcttgtgaa ggccatgata ttttgttttt ccccaattaa ttgctattgt gttattttac 1560
tacttctctc tgtatttttt cttgcattga cattatagac attgaggacc tcatccaaac 1620
aatttaaaaa tgagtgtgaa gggggaacaa gtcaaaatat ttttaaaaga tcttcaaaaa 1680
taatgcctct gtctagcatg ccaacaagaa tgcattgata ttgtgaacat ttgtgatata 1740
tgtattaata aatagagcaa ttacaagcaa aaaaaaatgn 1780

<210> 53
<211> 490
<212> DNA
<213> Homo sapiens

<400> 53
aattcggcag agaattttca tgagtcgcct tcaaaactct cgtgtagggt tgacaatgtg 60
ggggggtggg ggatccagct tattctttta ttttcaagtc cattcttggg gctggtgggg 120
aggcaggaga ataccctcc ctaagccctt agtgtgtgcc gagcttgctt tgtgatgttg 180
gcaggggagg ggagacctgg gtggtgactg agttcccttt atcaaaccct tcaatgggca 240
caaaattgag tgcttgattt taggttttat ttttttatga atgtccaaat ctgtgtttcc 300
ccctgccctc ccagactgtg tggccagttg aaagtgtctg gtttgtgttc atctctccct 360
catttctgga gcagggcctg agaccctgcc acatctccta tgctctgcat ccacgcctct 420
tttggacatt aaaggttgat tgatgcaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 480
aaaaaaaaaa 490

<210> 54
<211> 1944
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (466)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (634)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1308)
<223> n equals a,t,g, or c

<400> 54
acggtacgga attcccgggt cgacccacgc gtccgacccc ggacccggag tcgcggagag 60
ctgggcagtg ttggccgctg gcggagcgct ggggcagcat gaagtgcctg gtcacgggcg 120
gcaacgtgaa ggtgctcggc aaggccgtcc actccctgtc ccgcatcggg gacgagctct 180
acctggaacc cttggaggac gggctctccc tccggacggt gaactcctcc cgctctgcct 240
atgcctgctt tctctttgcc ccgctcttct tccagcaata ccaggcagcc acccctggtc 300
aggacctgct gcgctgtaag atcctgatga agtctttcct gtctgtcttc cgctcactgg 360
cgatgctgga gaagacggtg gaaaaatgct gcatctccct gaatggccgg arcagccgcc 420
tggtggtcca gctgcattgc aagttcgggg tgcggaagat camaanctgt ccttcmagga 480
ctgtgagtcc ctgcaggccg tcttcgaccc agcctcgtgc ccccacatgc tccgcgcccc 540
agcacgggtt ctgggggarg ctgttctgcc cttctctcct gcactggctg aagtgacgct 600
gggcattggc cgtggcgcag gktcatcctg gcantaccac gaggaggagg cagacagcac 660
tgccaaagcc atggtgactg agatgtgcct tggagaggag gatttccagc agctgcaggc 720
ccaggaaggg gtggccatca ctttctgcct caaggaattc cgggggctcc tgagctttgc 780
agagtcagca aacttgaatc ttagcattca ttttgatgct ccaggcaggc ccgccatctt 840
caccatcaag gactctttgc tggacggcca ctttgtcttg gccacactct cagacaccga 900
ctcgcactcc caggacctgg gctccccaga gcgtcaccag ccagtgcctc agctccaggc 960
tcacagcaca ccccacccgg acgactttgc caatgacgac attgactctt acatgatcgc 1020
catggaaacc actataggca atgagggctc gcgggtgctg ccctccattt ccctttcacc 1080
tggcccccag ccccccaaga gccccggtcc ccactccgag gaggaagatg aggctgagcc 1140

cagtacagtg cctgggactc ccccacccaa gaagttccgc tcactgttct tcggctccat 1200
cctggcccct gtacgctccc cccagggccc cagcctgtgc tggcggaaga cagtgagggt 1260
gaaggctgaa ccaagaacct gaagcctgta cccagaggcc ttggactnag acgaagcccc 1320
agccagtggc agaactgggt ctctcagccc tggggatcag aaaggtgggc ttgctggagc 1380
tgagctgttt cactgcctct cgcaggcccc agctggctgt cactgtaaag ctgtcccaca 1440
gcggtcgggc ctgggccgtt atctccccac aamccccarc caatcaggac tttccagact 1500
tggccctgaa ctactgacgt tcctacctct tatttctcat tgagcctcag gctatactcc 1560
agctggccaa ggctggaaac ctgtctccct caggctcacc ttcctaagga aaatgtcata 1620
gtaggtgctg ctggcccctg gtgatccagc ttctctgcca atcatgacct gttccttcct 1680
gaagtcctgg gcatgcatct gggacccccg tggagctgac aagttttcct tgctttcctg 1740
atactctttg gcgctgactt ggaattctaa gagccttgga cccgagtgtg tggctagggt 1800
tgccctggct ggggcccggt gccgagactc ccaagcggst ctgtgcagaa gagctgccag 1860
gcagtgtctt agatgtraga cggaggccat ggcgagaatc cagctttgac ctttattcaa 1920
gagaccagat gggtttgccc cagg 1944

<210> 55
<211> 994
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (896)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (971)
<223> n equals a,t,g, or c

<400> 55
cccccgtgcg cagtaccggg tccgcgcctg tccccgaaac ttcgcacccc gtcgaactct 60
cgcgagagcg ktatctgcgt gtcgggacgt gcggaggctc tcactttccg tcatggcgct 120
gaaggtagcg accgtcgccg gcagcgccgc gaaggcgtgc tcgggccagc ccttctctgc 180
cgtccctggg aggttctagg cgcccacgag gtcccctcga ggaacatctt ttcagaacaa 240
acaattcctc cgtccgctaa gtatggcggg cggcacacgg tgaccatgat cccaggggat 300
ggcatcgggc cagagctcat gctgcatgtc aagtccgtct tcaggcacgc atgtgtacca 360
gtggactttg aagaggtgca cgtgagttcc aatgctgatg aagaggacat tcgcaatgcc 420
atcatggcca tccgccggaa ccgcgtggcc ctgaagggca acatcgaaac caaccataac 480
ctgccaccgt cgcacaaatc tcgaaacaac atccttcgca ccagcctgga cctctatgcc 540
aacgtcatcc actgtaagag ccttccaggc gtggtgaccc ggcacaagga catagacatc 600
ctcattgtcc gggagaacac agagggcgag tacagcagcc tggagcatga gagtgtggcg 660
ggagtggtgg agagcctgaa gatcatcacc aaggccaagt ccctgcgcat tgccgagtat 720
gccttcaagc tggcgcagga gagcgggcgc aagaaagtga cggccgtgca caaggccaac 780
atcatgaaac tgggcgatgg gcttttcctc cagtgctgca gggaggtggc agcccgytac 840
cctcagwtca ccttcgagaa catgattgtg gataacacca ccatgcagct ggtgtnccgg 900
ccccagcagt ttgatgtcat ggtgatgccc aatctctatg gcaacatcgt caaacaatgt 960
ctgcgcggga ntggtcgggg gcccaagctt gttg 994

<210> 56
<211> 328

<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (123)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (156)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (170)
<223> n equals a,t,g, or c

<400> 56
gggtcgaccc acgcgtccgc ccacgcgtcc ggatgacttc attgccaaag ttgttcaaag 60
gtagccttgg ccctttttca tctgagtccc atttagagat gtataaagaa tgttgttgag 120
tanggcgcgg tggctcacgc ctgtaatccc cacacnttgg gaaggccgan gcaggcggat 180
cacgaggtca gaagattgag accattctgg ctaacatggt gaacccccat ctctactaaa 240
aatacaaaaa ttagtcaggc gcgatggcgg gcacatgtag taccagctac tcgggaggct 300
gatgcagaag aataacttgg aacctggg 328

<210> 57
<211> 1489
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (710)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1109)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1117)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1206)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1211)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1218)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1264)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1311)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1446)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1467)
<223> n equals a,t,g, or c

<400> 57
cggcacgagg ggtggtgtgg gtgtgtttag aaaaaagatg cattcctgaa gatctctggt 60
gctgaagggc ctcgagttcc tttcagagac tgtatttgac acactttagg tacacacaaa 120
cgaatggtat cacatgcaat attttaatgg agcaatggga gaggctcttt gaaatggggt 180
ttgcatcttt ttgtaacatt ttgatttctc tggtgcctta ttcctacttg atgctggcac 240
tcacataccc acaagaagct gacacagaag tcagccttag gcgtggggac atatgggtga 300
tgtttgagca tgcaggggcc atggggagtt tggtgtcagt tggtggagaa gggactagat 360
ggcatctctt agccgaggcc aacaggaact gcacaagtcc attatagtca aagttagcaa 420
ttttgatacg taaacacaat acttcattct tcctcatctg agctttcctt ccttcttcct 480
tttctatctc taccttctca taaaggtgct gctgctgctg ctaaggtgcc cggagtccag 540
aatgtccatt aatcactcag gcacgagcct ggcactgcca cgtcagcccc cagcatgacc 600
aaacccaggt ttctcttgct tggggctgag aactgtcaga tttttctcat caaaaatgtt 660
ttccaaggaa tcagtggatt acagtttttc tgcattgaaa atgcactttn aaaaaataaa 720
ttaaagctcc agactgttta aaatatacag agggagcagg ggaaagttaa gcatgtgcta 780
gtgtctgaac ccagttcagt ttatctccag ttgaaacgat atacactata ttatgtataa 840
atgtatacac acttcctata tgtatccaca tatatatagt gtatatatta tacatgtata 900
ggtgtgtata tgtgcatata tacacacatg cacataacaa aatcagatgc tcattacaaa 960
tccagatgct cattacaaaa ccagatgcta cacaaacagc agcagaggaa acaaggttgg 1020
actcttgcaa cagatcacaa aaaataaaaa cagctacttg cagtgacttt ggtcatttct 1080
gtatgttcat aaagaatgga tttgtaacna ggaaaanaag gaccagtgtt agtgaaaagg 1140
gaagatgggg cgaaccatct tgatccgatg cgaatccgta atggtctata tacatttcat 1200

cagtantcat ntagtcangt gattgattca gttctgctat gaaacattgt aacacgtacc 1260
cacnactgac aactactcgt gagcgttcat taggagtgac ctaactttgc ntgcctgctc 1320
atgggacgag ctccttaggt ggagataccg gggaatagag aaagatgcac gtctctgcgt 1380
tgtcgcgtgc tttgaggggc ggtctttacc ttccgtgttg gagtcctccc tgagtccggc 1440
gctggntgcg ggacacggcc cttctcngtg tcccaggcgc tgcctcatt 1489

<210> 58
<211> 1283
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (38)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (550)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1242)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1250)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1260)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1263)
<223> n equals a,t,g, or c

<400> 58
aggtaatttg aattgagaga gagtaagtga cttgctgnaa aaagggttaa tcaacagcag 60
agctgggatt tgaacccata actctgtcaa agcctccact cctaactcct gttcatgctc 120
ctgtggagaa aatgcttgta gtaacatatt ttaaatgtac taacaagacc agtcatgggm 180
aaatgtttct gagacaaatc tctagtttat gatttaaaac agtacgtttt cttacgtgac 240
gaaaacaaaa agtgtgttaa tttgttccca gtggttgaag ttatttgcca acaattttac 300
tgtttctctt catctgttta taggatttct ctgcctcttc caaacttttc ctccctgaac 360
ctgaggggta agcattttat ttccctttag gaaaaacgtc agctgcttgt aaccactgtg 420
tttatgtcaa agcattcatt ttttttagga tatctgaaaa aatgccatat aagaraaaam 480
tctataaaac atctatwatt ttcgaaccca agtacactct tgcattctaw gctttaagtt 540

aaatgcaaan tccttttcc ttcttcctgc tgcaagtact atctcatcct gatgctcaag 600
agtgtcaggg cctgggtttc caaacagaga ctaccctaaa attatttggc gagtagtact 660
ttacacaatt gcctctcccc cacaaatcat aattgtttca gtaaaatggt tacttggttt 720
ttccaagaaa aaactcgttt ttactcattt ttggcctgtt tgtttattta gaaactaatc 780
tggattcact ccctctggtt gatacccact caaaaaggac acttctgatt aagacggttg 840
aaactagaga tggacaggtt atcaacgaaa cttctcagca tcacgatgac cttgaataaa 900
aattgcacac actcagtgca gcaatatatt accagcaaga ataaaaaaga aatccatatc 960
ttaaagaaac agctttcaag tgcctttctg cagtttttca ggagcgcaag atagatttgg 1020
aataggaata agctctagtt cttaacaacc gacactccta caagatttag aaaaaagttt 1080
acaacataat ctagtttaca gaaaaatctt gtgctagaat acttttaaa aggtattttg 1140
aataccatta aaactgcttt ttttttcca gcaagtatcc aaccaacttg gttctgcttc 1200
aataaatctt tggaaaaact maaaaaaaaa aaaaaaaaam mnggggggn gcccggggtn 1260
ccnccggggg gcccaagttt tac 1283

<210> 59
<211> 740
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (696)
<223> n equals a,t,g, or c

<400> 59
agaaggagcg cggggaggac gtaccttgtg agatgcgagc cggccaacag cttgcaagca 60
tgctccgctg gacccgagcc tggaggctcc cgcgtgaggg actcggcccc cacggcccta 120
gcttcgcgag ggtgcctgtc gcacccagca gcagcagcgg cggccgaggg ggcgccgagc 180
cgaggccgct tccgctttcc tacaggcttc tggacgggga ggcagccctc ccggccgtcg 240
tctttttgca cgggctcttc ggcagcaaaa ctaacttcaa ctccatcgcc aagatcttgg 300
cccagcagac aggccgtagg tgctgacggt ggatgctcgt aaccacggtg acagccccca 360
cagcccagac atgagctacg agatcatgag ccaggacctg caggaccttc tgccccagct 420
gggcctggtg ccctgcgtcg tcgttggcca cagcatggga ggaaagacag ccatgctgct 480
ggcactacag aggccagagc tggtggaacg tctcattgct gtagatatca gcccagtgga 540
aagcacaggt gtctcccact ttgcaaccta tgtggcagcc atgagggcca tcaacatcgc 600
agataggctt gccccgctcc cgtgcccgaa aactggcgga tgaacagctc agttctgtca 660
tccaggacat ggccgtgcgg cacacttgct tcaatnaacc tggtagaggt agacgggcgt 720
tttcgtgttg gagggtggaa 740

<210> 60
<211> 1291
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (6)
<223> n equals a,t,g, or c

<220>
<221> misc feature

<222> (7)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (147)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1211)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1283)
<223> n equals a,t,g, or c

<400> 60
actttnnccc ctccccctttcctttcccgt ctcacgcgcc aggccgcttg cacatgcgca 60
ttaggtacaa agcctcgctc tttgtcccca tctgtcgttc acacgaactc aagcctttgg 120
cattcggcag ccaatagaat ctaaganatg gcggaaaaat gattccgcct cgggagctaa 180
acttgattgg cagtttagct aaccaatcga gaacgccatt tgtamccctt ggcaggcamc 240
gagctccgtc gtctcgtttc cggcggtcgc gcgctctttt ctcgggacgg gagaggccgt 300
gtagcgtcgc cgttactccg aggagatacc agtcggtaga ggagaagtcg aggttagagg 360
gaactgggag gcactttgct gtctgcaatc gaagttgagg gtgcaaaaat gcagagtaat 420
aaaactttta acttggagaa gcaaaaccat actccaagaa agcatcatca acatcaccac 480
cagcagcagc accaccagca gcaacagcag cagccgccac caccgccaat acctgcaaat 540
gggcaacagg ccagcagcca aaatgaaggc ttgactattg acctgaagaa ttttagaaaa 600
ccaggagaga agaccttcac ccaacgaagc cgtctttttg tgggaaatct tcctcccgac 660
atcactgagg aagaaatgag gaaactattt gagaaatatg gaaaggcagg cgaagtcttc 720
attcataagg ataaaggatt tggctttatc cgcttggaaa cccgaaccct agcggagatt 780
gccaaagtgg agctggacaa tatgccactc cgtggaaagc agctgcgtgt gcgctttgcc 840
tgccatagtg catcccttac agttcgaaac cttcctcagt atgtgtccaa cgaactgctg 900
gaagaagcct tttctgtgtt tggccaggta gagagggctg tagtcattgt ggatgatcga 960
ggaaggccct caggaaaagg cattgttgag ttctcaggga agccagctgc tcggaaagct 1020
ctggacagat gcagtgaagg ctccttcctg ctaaccacat ttcctcgtcc tgtgactgtg 1080
gagcccatgg accagttaga tgatgaagag ggacttccag agaagctggt tataaaaaac 1140
cagcaatttc acaaggaacg agagcagcca cccagatttg cacagcctgg ctcctttkga 1200
gtatgaatat ngccatgcgc tgggaaggca ctcattgaga tggagaaagc agcctggggt 1260
gacaagaagt gaagactcct gtntccaaaa a 1291

<210> 61
<211> 971
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (856)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (886)
<223> n equals a,t,g, or c

<400> 61
ctgcagtacc ggtccggaat tcccgggtcg acccacgcgt ccgggtctgt ggtcctctct 60
cggctcctcg cggctcgcgg cggccgacgg ttcctgggac acctgcttgc ttggcccgtc 120
cggcggctca gggcttctct gctgcgctcc cggttcgctg gacgggaaga agggctgggc 180
cgtcccgtcc cgtccccatc ggaaccccaa gtcgcgccgc tgacccgtcg cagggcgaga 240
tgagcgcgga cgcagcggcc ggggcgcccc tgccccggct ctgctgcctg gagaagggtc 300
cgaacggcta cggcttccac ctgcacgggg agaagggcaa gttgggccag tacatccggc 360
tggtggagcc cggctcgccg gccgagaagg cggggctgct ggcgggggac cggctggtgg 420
aggtgaacgg cgaaaacgtg gagaaggaga cccaccagca ggtggtgagc cgcatccgcg 480
ccgcactcaa cgccgtgcgc ctgctggtgg tcgaccccga gacggacgag cagctgcaga 540
agctcggcgt ccaggtccga gaggagctgc tgcgcgccca ggaagcgccg gggcaggccg 600
agccgccggc cgccgccrag gtgcaggggg ctggcaacga aaatrarcct cgcraggccg 660
acaagagcca cccggagcag cgcgagcttc ggcctcggct ctgtaccatg aagaagggcc 720
ccagtggcta tggcttcaac ctgcacagcg acaagtccaa gccaggccag ttcatccggt 780
cagtggaccc agactccccg gctgaggctt cagggctccg ggcccaggat cgcattgtgg 840
aggtgatgct tctcgnttct cttcctatct gaactgcccc caaccnctgc agattagcag 900
caccttgggg cagccatcat accatcatgg ggtttgatta gcccacgggc attagccaac 960
ctgggaggtt g 971

<210> 62
<211> 618
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (563)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (598)
<223> n equals a,t,g, or c

<400> 62
gggtcgaccc acgcgtccgg cagaaatgaa ggaccacctg ccaagacgaa gagctgggtg 60
ggacccacgc tgcattttca tcgaaagagt gaacatctag tgggactgaa agttctttgt 120
tgtttcagat tgtagagtgt gattgatgga attggtctgt ggaaattgca ttgtttttat 180
ttctttatgt aatcagttta agtaataggg ggtatatata atcgtaagta ttttagggtg 240
ggaggggcta ttaagtaatt aagtgggtgg ggttagttta aaagttagca tgatatgtat 300
tagataactc tataagtgga catgtgtact tacttgtgat cctttaccct atgattgcta 360
cccttaacga tttcaaataa actcagaggg aactgcaggg agatcaaacc atttagggca 420
aattggacat gaataaaact ctagtgggaa aaagttcaaa ggtgattgaa taaataattt 480
aactttgccc tgggtattaa gtccagggct cccagattgt ggagcagagc cttggagagt 540
acaggatgaa ggagatagat gcnccttga cttgccggga atgaaattgg attaatgnaa 600

ggatggtaaa taattcca 618

<210> 63
<211> 1138
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (7)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (15)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (22)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (27)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (29)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1123)
<223> n equals a,t,g, or c

<400> 63
tctatanatc atganaggaa anggtancng acagtacggt cggattcccg ggtcgaccca 60
cgctccgatg acttcacccc tctggagatc ctctggacct tctccatcta cctggagtca 120
gtggccatct tgccgcagct gttcatggtg agcaagaccg gcgaggcgga gaccatcacc 180
agccactact tgtttgcgct aggcgtttac cgcacgctct atctcttcaa ctggatctgg 240
cgctaccatt tcgagggctt cttcgacctc atcgccattg tggcaggcct ggtccagaca 300
gtcctctact gcgatttctt ctacctctat atcaccaaag tcctaaaggg gaagaagttg 360
agtttgccgg catagccccg gtcctctcca tctctctcct cggcagcagc gggaggcaga 420
ggaaggcggc agaagatgaa gagctttccc atccaggggt gacttttta agaacccacc 480
tcttgtgctc cccatcccgc ctcctgccgg gtttcagggg gacagtggag gatccaggtc 540
ttggggagct caggacttgg gctgtttgta gtttttgcc ttttagacaa gaaaaaaaaa 600
tctttccact ctttagtttt tgattctgat gactcgtttt tcttctactc tgtggcccca 660
atttttataa agtgtttttg agtgtcctat gggccggggc agggtccaag atcttttccc 720
ttccccaggc ccctcggctc cctcccagat cccaccccca gccccactgg ttgccaaaca 780

ctaaatctgc cgacacccat ctgccccacc tcctgccatg gccatgaacc gcgaccccca 840
ctaaatttct agattgggga tagggagaaa gggaggccca ggaaggtctc ccctgatttt 900
ttttcatagt aatttttttc cccagagttt gaatttttg gtcttctcct ggtttttgg 960
caaattaggg gggcccgggg ctcaagtgcg ggaaggggc tggcccgagg atcccatggc 1020
tctcacacca tgtttttgta cagaactgat ggttgaatct ttgttctctt gaaataaaca 1080
gaagaaaatg aaaccttaaa aaaaaaaaaa aaaaaaaaaa acncgggggg gggcccgg 1138

<210> 64
<211> 418
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (365)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (371)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (380)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (391)
<223> n equals a,t,g, or c

<400> 64
tgctcatcca gaggagctca ccacagtcac tgcgacagac tgccacactc accctggcct 60
ggcctcagag aagttgagct actggcctca gttcacacag agcagatgga ggaagagctg 120
gcactaggac ccaggggca gggggagcc tccctggctg gaagggatgg caggagcgct 180
ggtgcaggta gctatggagc tctggccaac tctgcctggg gaggtcccag gaaggtggcg 240
tcagcatctg cagccgcgtc gacgttgtcg gagcctccgc ggaggaccca ggagagccgg 300
actaggacca gggccctggg cctccccaca ctccccatgg agaagctggc ggcctctaac 360
agagncccaa ngggcttggn cggtcctggg ncgtgaaaat gttcaagtgc ccgattga 418

<210> 65
<211> 2836
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (2834)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2836)
<223> n equals a,t,g, or c

<400> 65
aagaaaccgc ccattacaca ccccagtaca ccagcagagg aaacttataa cctcgggagg 60
caggtccttc ccctcagtgc ggtcacatac ttccagaaga gcggaccagg gctgctgcca 120
gcacctgcca ctcagagcgc ctctgtcgct gggacccttc agaactctct ttgctcacaa 180
gttaccaaaa aaaaaagagc caacatgttg gtattgctgg ctggtatctt tgtggtccac 240
atcgctactg ttattatgct atttgttagc accattgcca atgtctggtt ggtttccaat 300
acggtagatg catcagtagg tctttggaaa aactgtacca acattagctg cagtgacagc 360
ctgtcatatg ccagtgaaga tgccctcaag acagtgcagg ccttcatgat tctctctatc 420
atcttctgtg tcattgccct cctggtcttc gtgttccagc tcttcaccat ggagaaggga 480
aaccggttct tcctctcagg ggscaccaca ctggtgtgct gsctgtgcat tcttgtgggg 540
tgtccatcta cactagtcat tatgcgaatc gtgatggaac gcatatgcac cacggctatt 600
cctacatcct gggctggatc tgcttctgct tcagcttcat catcggcgtt ctctatctgg 660
tcctgagaaa gaaataaggc cggacgagtt catggggatc tgggggtgg ggaggaggaa 720
gccgttgaat ctgggaggga agtggaggtt gctgtacagg aaaaaccgag ataggggagg 780
ggggaggggg aagcaaaggg gggaggtcaa atcccaaacc attactgagg ggattctcta 840
ctgccaagcc cctgccctgg ggagaaagta gttggctagt actttgatgc tcccttgatg 900
gggtccagag agcctccctg cagccaccag acttggcctc cagctgttct tagtgacaca 960
cactgtctgg ggccccatca gctgccacaa caccagcccc acttctgggt catgcactga 1020
ggtccacaga cctactgcac tgagttaaaa tagcggtaca agttctggca agagcagata 1080
ctgtctttgt gctgaatacg ctaagcctgg aagccatcct gcccttctga cccaaagcaa 1140
aacatcacat tccagtctga agtgcctact ggggggcttt ggcctgtgag ccattgtccc 1200
tctttggaac agatatttag ctctgtggaa ttcagtgaca aaatgggagg aggaaagaga 1260
gtttgtaagg tcatgctggt gggttagcta aaccaagaag gagacctttt cacaatggaa 1320
aacctggggg atggtcagag cccagtcgag acctcacaca cggctgtccc tcatggagac 1380
ctcatgccat ggtctttgct aggcctcttg ctgaaagcca aggcagctct tctggagttt 1440
ctctaaagtc actagtgaac aattcggtgg taaaagtacc acacaaacta tgggatccaa 1500
ggggcagtct tgcaacagtg ccatgttagg gttatgtttt taggattccc ctcaatgcag 1560
tcagtgtttc ttttaagtat acaacaggag agagatggac atggctcatt gtagcacaat 1620
cctattactc ttcctctaac atttttgagg aagttttgtc taattatcaa tattgaggat 1680
cagggctcct aggctcagtg gtagctctgg cttagacacc acctggagtg atcacctctt 1740
ggggaccctg cctatcccac ttcacaggtg aggcatggca attctggaag ctgattaaaa 1800
cacacataaa ccaaaaccaa acaacaggcc cttgggtgaa aggtgctata taattgtgaa 1860
gtattaagcc taccgtattt cagccatgat aagaacagag tgcctgcatt cccaggaaaa 1920
tacgaaaatc ccatgagata aataaaaata taggtgatgg gcagatcttt tctttaaaat 1980
aaaaaagcaa aaactcttgt ggtacctagt cagatggtag acgagctgtc tgctgccgca 2040
ggagcacctc tatacaggac ttagaagtag tatgttattc ctggttaagc aggcattgct 2100
ttgccctgga gcagctattt taagccatct cagattctgt ctaaaggggt tttttgggaa 2160
gacgttttct ttatcgccct gagaagatct accccaggga gaatctgaga catcttgcct 2220
acttttcttt attagctttc tcctcatcca tttcttttat acctttcctt tttggggagt 2280
tgttatgcca tgatttttgg tatttatgta aaaggattat tactaattct atttctctat 2340
gtttattcta gttaaggaaa tgttgagggc aagccaccaa attacctagg ctgaggttag 2400
agagattggc cagcaaaaac tgtgggaaga tgaactttgt cattatgatt tcattatcac 2460
atgattatag aaggctgtct tagtgcaaaa aacatactta catttcagac atatccaaag 2520
ggaatactca cattttgtta agaagttgaa ctatgactgg agtaaaccat gtattccctt 2580
atcttttact ttttttctgt gacatttatg tctcatgtaa tttgcattac tctggtggat 2640
tgttctagta ctgtattggg cttcttcgtt aatagattat ttcatatact ataattgtaa 2700

atattttgat acaaatgttt ataactctag ggatataaaa acagattctg attcccttca 2760
ttgtgtgaat gtttttttct aaaaaaaatg tggagaaata tggataatta tgacatttat 2820
ccctcattaa agcngn 2836

<210> 66
<211> 2305
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1973)
<223> n equals a,t,g, or c

<400> 66
aaacgttccc ggtccttcct gaaccaagct gtggaccctc gtaagcaacc cggacaccga 60
cgcgctcatc tgctggagcc cgagcgsgaa cagcttccac gtgttcgacc agggccagtt 120
tgccaaggag gtgctgccca agtacttcaa gcacaacaac atggccagct tcgtgcggca 180
gytcaacatg tatggcttcc ggaaagtggt ccacatcgag cagggcgkcc tggtcaagcc 240
agagagagac gacacggagt tccagcaccc atgcttcctg cgtggccagg agcagctcct 300
tgagaacatc aagaggaaag tgaccagtgt gtccaccctg aagagtgaag acataaagat 360
ccgccaggac agcgtcacca agctgctgac ggacgtgcag ctgatgaagg ggaagcagga 420
gtgcatggac tccaagctcc tggccatgaa gcatgagaat gaggctctgt ggcgggaggt 480
ggccagcctt cggcagaagc atgcccagca acagaaagtc gtcaacaagc tcattcagtt 540
cctgatctca ctggtgcagt caaaccggat cctgggggtg aagagaaaga tccccctgat 600
gctgaacgac agtggctcag cacattccat gcccaagtat agccggcagt tctccctgga 660
gcacgtccac ggctcgggcc cctactcggc cccctcccca gcctacagca gctccagcct 720
ctacgccccc gatgctgtgg ccagctctgg acccatcatc tccgacatca ccgagctggc 780
tcctgccagc cccatggcct cccccggcgg gagcatagac gagaggcccc tatccagcag 840
ccccctggtg cgtgtcaagg aggagccccc cagcccgcct yagagccccc gggtagagga 900
ggcgagtccc gggsgcccat cttccgtgga caccctcttg tccccgaccg ccctcattga 960
ctccatcctg cgggagagtg aacctgcccc cgsctccgtc acagccctca cggacgccag 1020
gggccacacg gacaccgagg gccggcctcc ctcccccccg cccacctcca cccctgaaaa 1080
gtgcctcagc gtasctgcct ggacaagaat gagctcagtg accacttgga tgctatggac 1140
tccaacctgg ataacctgca gaccatgctg agcagccacg gcttcagcgt ggacaccagt 1200
gccctgctgg acctgttcag cccctcggtg accgtgcccg acatgagcct gcctgacctt 1260
gacagcagcc tggccagtat ccaagagctc ctgtctcccc aggagccccc caggcctccc 1320
gaggcagaga acagcagccc ggattcaggg aagcagctgg tgcactacac agcgcagcgc 1380
tgttcctgct ggaccccggc tccgtggaca ccgggagcaa cgacctgccg gtgctgtttg 1440
agctgggaga gggctcctac ttctccgaag ggacggcttc gcaagggacc ccaccatctc 1500
cctgctgaca ggctcggagc ctcccaaagc caaggacccc actgtctcct agaggccccg 1560
gaggagctgg gccagccgcc cacccccacc cccagtgcag ggctggtctt ggggaggcag 1620
ggcagcctcg cggtcttggg cactggtggg tcggccgcca tagccccagt aggacaaacg 1680
ggctcgggtc tgggcagcac ctctggtcag gagggtcacc ctggcctgcc agtctgcctt 1740
cccccaaccc cgtgtcctgt ggtttggttg ggcttcacag ccacacctgg actgaccctg 1800
caggttgttc atagtcagaa ttgtattttg gatttttaca caactgtccc gttccccgct 1860
ccacagagat acacagatat atacacacag tggatggacg gacaagacag gcagagatct 1920
ataaacagac aggctctatg ctatggcctc catgtgtttc ctctgtccca ggntggtgcg 1980
gtggttggtg ctgcaatgag gaggggccca gggcacagaa gggccgggct gcagtggcct 2040
cctgggggaa gacggatgtt gcagctagct ccgtgcctgc ccgactcccc aggaccagca 2100
tgtgcttgca gttctttatt gagggaccag gggtgggcgc ctcaccttgg ccctgggggt 2160

ctctggttgt cacaggacca ccaggaaccc ccttcccaag gtgttcgcac tcggacaggt 2220
gatgcggggc gggcacactg tctttctgcc agagccagca ccctgtgtag gcacggggaa 2280
cgggagcctg tcccgtagct ttagg 2305

<210> 67
<211> 1907
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1221)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1655)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1896)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1904)
<223> n equals a,t,g, or c

<400> 67
gacgcccgcc gcctcactgt ttctagcctt cagtggccaa cgttggtagt cattgtgacc 60
tcagcctgaa aatccctgaa attagcatcc aggatatgac agcccaggtg accagcccat 120
cgggcaagac ccatgaggcc gagatcgtgg aaggggagaa ccacacctac tgcatccgct 180
ttgttcccgc tgagatgggc acacacacag tcagcgtgaa gtacaagggc cagcacgtgc 240
ctgggagccc cttccagttc accgtggggc ccctagggga agggggagcc cacaaggtcc 300
gagctggggg ccctggcctg gagagagctg aagctggagt gccagccgaa ttcagtatct 360
ggacccggga agctggtgct ggaggcctgg ccattgctgt cgagggcccc agcaaggctg 420
agatctcttt tgaggaccgc aaggacggct cctgtggtgt ggcttatgtg gtccaggagc 480
caggtgacta cgaagtctca gtcaagttca acgaggaaca cattcccgac agcccttcg 540
tggtgcctgt ggcttctccg tctggcgacg cccgccgcct cactgtttct agccttcagg 600
agtcagggct aaaggtcaac cagccagcct cttttgcagt cagcctgaac ggggccaagg 660
gggcgatcga tgccaaggtg cacagcccct caggagccct ggaggagtgc tatgtcacag 720
aaattgacca agataagtat gctgtgcgct tcatccctcg ggagaatggc gtttacctga 780
ttgacgtcaa gttcaacggc acccacatcc ctggaagccc cttcaagatc cgagttgggg 840
agcctgggca tggaggggac ccaggcttgg tgtctgctta cggagcaggt ctggaaggcg 900
gtgtcacagg gaacccagct gagttcgtcg tgaacacgag caatgcggga gctggtgccc 960
tgtcggtgac cattgacggc ccctccaagg tgaagatgga ttgccaggag tgccctgagg 1020
gctaccgcgt cacctatacc cccatggcac ctggcagcta cctcatctcc atcaagtacg 1080
gcggccccta ccacattggg ggcagcccct tcaaggccaa agtcacaggc ccccgtctcg 1140
tcagcaacca cagcctccac gagacatcat cagtgtttgt agactctctg accaaggcca 1200
cctgtgcccc ccagcatggg nccccgggtc ctgggcctgc tgacgccagc aaggtggtgg 1260

ccaagggctg gggctgagca aggcctacgt aggccagaag agcagcttca cagtagactg 1320
cagcaaagca ggcaacaaca tgctgctggt gggggttcat ggcccaagga ccccctgcga 1380
ggagatcctg gtgaagcacg tgggcagccg gctctacagc gtgtcctacc tgctcaagga 1440
caagggggag tacacactgg tggtcaaatg gggggacgag cacatcccag gcagccccta 1500
ccgcgttgtg gtgccctgag tctggggccc gtgccagccg gcagccccca agcctgcccc 1560
gctacccaag cagccccgcc ctcttccccc caaccccggc ccaggccgcc ctggccgccc 1620
gcctgtcact gcagccgccc ctgccctgtg ccgtnctgcg ctcacctgcc tccccagcca 1680
gccgctgacc tctcggcttt cacttgggca gagggagcca tttggtggcg ctgcttgtct 1740
tctttggttc tgggaggggt gagggatggg ggtcctgtac acaaccaccc actagttctc 1800
ttctccagcc aagaggaata aagttttgct tccattcwma aaaaaaaaaa aaaaaaaaaa 1860
tygggggggg kccgktaacc caattggcct ttaagngggt ggtntta 1907

<210> 68
<211> 815
<212> DNA
<213> Homo sapiens

<400> 68
gggtcgaccc acgcgtccgt ttttttaag tgtgaatttt ttattgagat aaacaacagc 60
ataaagaata caagtagcca aatggttttg aaaaaccaaa ttaggtcaaa gttctaaatt 120
aaaaatagca gttgtgtttc aatttacctt attctagcaa ttwaagtwgg taacatacaa 180
atagttatwc tgatacaaga tattaaagac atactcagtt ttaatcaact acctctcaag 240
aaacagtagg gcctctgtaa aattggagac tgataggttg atcagaaact caccctaaat 300
ctgaacgggt gccgctataa tttgtgacat ctggcaagat ttccctttat gtatatattt 360
taacaatccg cttggacacg aacaaagcca cacttctaac tgcttctggc gaactgattt 420
tatttttaat ttttttcaat aaagatattc ttagatactg aaagaaatag ttaatgagtt 480
tgcatttgtg cttgagaaaa tttggctcaa gtccatttgg ctgtagtgtc aacgatgttt 540
ccagtagtgt ttagatttgg tgtcttcaaa ggtagttgat taaaaccaag tgtgtcttta 600
atatcttgta tcagaataac tttgtatgtt accaacttaa attgctagaa taaggtaaat 660
tgatacacaa ctgctatttt taatttagaa ctttgaccta atttgggttt tcaaaaccat 720
tttggctact tgtattcttt atgctgttgt ttatttcaat aaaaaattca cacctaaatg 780
tatacttact aaaaaaaaaa aaaaaaaaaa actcg 815

<210> 69
<211> 1150
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (14)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (20)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (23)

<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (25)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1150)
<223> n equals a,t,g, or c

<400> 69
ctcgtgcaat tcgngcagan tgntncctgg cctccttttg cttgcccgtg gctgttcctc 60
ctgggtcctc ttgccctggg ctggatgcct tcttcggctc cccctctgca tgtgataact 120
tggggtggcc cttggagctg tgccaaagct acacctcggg gtcctagtct caactggcct 180
gcgtactgct gtgggctcac cccgccttcc tcccacagcc ctgggcgctg cctatggcac 240
agccaagagc ggtaccggca ttgcggccat gtctgtcatg cggccggagc agatcatgaa 300
gtccatcatc ccagtggtca tggctggcat catcgccatc tacggcctgg tggtggcagt 360
cctcatcgcc aactccctga atgacgacat cagcctctac aagagcttcc tccagctggg 420
cgccggcctg agcgtgggcc tgagcggcct ggcagccggc tttgccatcg gcatcgtggg 480
ggacgctggc gtgcggggca ccgcccagca gccccgacta ttcgtgggca tgatcctgat 540
tctcatcttc gccgaggtgc tcggcctcta cggtctcatc gtcgccctca tcctctccac 600
aaagtagacc ctctccgagc ccaccagcca cagaatatta tgtaaagacc acccctcctc 660
attccagaac gaacagcctg acacatacgc acggggccgc cgcccccagt agttggtctt 720
gtacatgcgc agtgtcctag tgcccatcgt ctgtttcccc ggccttgccc ccgcccgccc 780
cgtgccgtgg acatctgggc ccactcatcg cccctccagg cccccggcgc cccacccccc 840
agagtgctct gtgtatgcgg atgatttaga attgtcattt ctctttactg gatgtttatt 900
tataaagatc tggcctgttc ctgcgtctgc ggagcggccc ttgtctccca gctatctata 960
accttagcta gagtgtcgcc ttgtgggttc ctgttgctga gacttcctgg atggagccgc 1020
cctcaccgcc gggcccgtgg ccctgcgcgg agctgtgtcc aataaagttc ttggatgtga 1080
aaaaaaaaaa aaaaaaaaaa aaaaaaraaa araaaaaaaa aaaraaaraa aaraaaawaa 1140
gaaaaaaaan 1150

<210> 70
<211> 344
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (287)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (333)
<223> n equals a,t,g, or c

<220>
<221> misc feature

<222> (339)
<223> n equals a,t,g, or c

<400> 70
cgcaggctct gcggccgggt tccttccgcg ggacggggag aaagagagag cgcgaaagag 60
agaggatgtc tctctcagat tggcacctgg cggtgaagct ggctgaccag ccacttgccc 120
caaagtctat tctccagttg ccagagtcag agctgggtga atactctctg gggggctaca 180
gtatttcatt tctgaaacag ctcattgctg gcaaactcca ggagtcggtt ccagaccctg 240
agctgattga tctgatatac tgtggccgga agcttaaaga tgaccanacc ttgacttcta 300
cggtattcaa cctggctcca catccatgtt ctncggaant cctg 344

<210> 71
<211> 448
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (425)
<223> n equals a,t,g, or c

<400> 71
tcgacccacg catccgaaga tgttcttgct gccccttccg gctgccgggc gagtcgtcct 60
ccgacgtctg ggcgtgaaca gttctgggca cggggtctcg ccgccgcaga catgacgaag 120
ggtcttgttt taggaatcta tagtaaagac aaagaagatg atgtgccaca gtttacgagt 180
gcaggagaga atttcgataa attggtgtct ggaaagttga gagaaatttt gaacatatct 240
ggacctcctc tgaaagcagg caaaacccga acctttttatg gtctgcatga ggacttcccc 300
agcgtggtgg tggtcggcct cggcagaaag gcagctggag tcgatgacca ggaaaactgg 360
cmtgaaggca aagaaaacat cagagtcgcc atgcaacggg gtgcaggcag gttccaagac 420
ctggnaatct cttctgtgga aggtggat 448

<210> 72
<211> 2825
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1809)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2093)
<223> n equals a,t,g, or c

<400> 72
gagaaggagg tcgcgcggcc tcatcccggg ccgcgcccca ggccgccgcc ggccccgcgc 60
tcatgaggtt gctcgcgcgc ccccgccgat cgccatggat cggatgaaga agatcaaacg 120
gcagctgtca atgacactcc gaggtggccg aggcatagac aagaccaatg gtgcccctga 180
gcagataggc ctggatgaga gtggtggtgg tggcggcagt gaccctggag aggcccccac 240

acgtgctgct cctggggaac ttcgttctgc acggggccca ctcagctctg caccagagat 300
tgtgcacgag gacttgaaga tggggtctga tggggagagt gaccaggctt cagccacgtc 360
ctcggatgag gtgcagtctc cagtgagagt gcgtatgcgc aaccatcccc cacgcaagat 420
ctccactgag gacatcaaca agcgcctatc actaccagct gacatccggc tgcctgaggg 480
ctacctggag aagctgaccc tcaatagccc catctttgac aagcccctca gccgccgcct 540
ccgtcgtgtc agcctatctg agattggctt tgggaaactg gagacctaca ttaagctgga 600
caaactgggc gagggtacct atgccaccgt ctacaaaggc aaaagcaagc tcacagacaa 660
ccttgtggca ctcaaggaga tcagactgga acatgaagag ggggcaccct gcaccgccat 720
ccgggaagtg tccctgctca aggacctcaa acacgccaac atcgttacgc tacatgacat 780
tatccacacg gagaagtccc tcacccttgt ctttgagtac ctggacaagg acctgaagca 840
gtacctggat gactgtggga acatcatcaa catgcacaac gtgaaactgt tcctgttcca 900
gctgctccgt ggcctggcct actgccaccg gmagaaggtg ctacaccgag acctcaagcc 960
ccagaacctg ctcatcaacg agaggggaga gctcaagctg gctgactttg gcctggcccg 1020
agccaagtca atcccaacaa agacatactc caatgaggtg gtgacactgt ggtaccggcc 1080
ccctgacatc ctgcttgggt ccacggacta ctccactcag attgacatgt ggggtgtggg 1140
ctgcatcttc tatgagatgg ccacaggccg tcccctcttt ccgggctcca cggtggagga 1200
acagctacac ttcatcttcc gtatcttagg aaccccaact gaggagacgt ggccaggcat 1260
cctgtccaac gaggagttca agacatacaa ctaccccaag taccgagccg aggccctttt 1320
gagccacgca ccccgacttg atagcgacgg ggccgacctc ctcaccaagc tgttgcagtt 1380
tgagggtcga aatcggatct ccgcagagga tgccatgaaa catccattct tcctcagtct 1440
gggggagcgg atccacaaac ttcctgacac tacttccata tttgcactaa aggagattca 1500
gctacaaaag gaggccagcc ttcggtcttc gtcgatgcct gactcaggca ggccagcttt 1560
ccgcgtggtg gacaccgagt tctaagccac agaccgaggc cccagcaggc agcggctgga 1620
gggatgccac acccctcaca gggcagcccc caactacatc ttccctgctt actctctgcc 1680
tacctgcctg agccatgttc acctgcccac ttgtcccctg ctgcctgccc aaacacccca 1740
ccattggcct gtcaacccac ccattggcct gtctgctggg tgctaacaaa gctctcatca 1800
ctccttcant tggtctgtct gtctctgtct tggtagttgc cggtggacag catggccgtg 1860
ccagcctccc acactgaggc caggtctacc ccccatcata ccagccccma graccaytam 1920
cccacggsca gccaggggtc caragctagc ccaggctggg gatctcgact cagacaagat 1980
ggtgacaatg ccttgagtct gaggcatcct ctgcctgctt tcctgcctgc cccacctgcc 2040
tcatattgtg tgggcctttt tttgtttgtt tcattcattg ttttttttt ttnaattatt 2100
ttaaatgaga tttttgtttt ttttaaatgc aatatctctg tatacagact ggctgggccc 2160
acccccctgcg tgtggccctc ccacagtatt ttgtgcaatg aagccctgct cccagccttt 2220
cagagacagg gacacagccc ctatttggaa ccctgatcat caccagaccc tgggattggc 2280
tatgggaaag catgccacag ccactcgcct tcctaccccc gcccgccatc cccagttgca 2340
gggggatctg gggactacca gagactctgg gaaatggaca aggtgggggg ccccactctt 2400
tctctcctgc agtcccgtag ctggggcctc cttccttctc agggtctccc cagcccagtc 2460
cccttgctcc catcccactc ggtgctgttg ggtaggggcc ctgccaggaa ctgaccagct 2520
cagcgaggag ccataatgtg catatgtgca caagcagggt tgggggaggg gggtgtgagg 2580
ggttgtgccc aggtgttgcc ccctatctcc tggggagggt gaggcagggc agggacagtc 2640
tccagggtca gtccctggat gggtggttac ctccccttcc tccaccctaa gccctggggc 2700
cctgaaatgg ggtgggaggg caggggtggg agccctccta gtgggtttgg ggggttgggt 2760
tcctgaatgc accataatcg ctgtatgaaa tattaaaaag tctaaagtga aaaaaaaaaa 2820
aaaaa 2825

<210> 73
<211> 510
<212> DNA
<213> Homo sapiens

<400> 73

atgtacgaga gcgcatccaa agaacctagt agagaaaggt attctaacca ctgagaagca 60
gaatttccts ctatttgaca tgactactca tccagtgacc aatacaacag agaaacagcg 120
actagtgaaa aaacttcaag atagtgtact agagcggtgg gtaaatgacc ctcagcgtat 180
ggacaagcga acactagcac tcctggtgct agcccactcc tctgatgtgc tagagaatgt 240
cttctcctct ctgacagatg acaagtatga tgtggcaatg aatcgagcca aggacttagt 300
agaactggac cctgaagtgg aagggacaaa gccyagtgcc acagaratga tctgggctgt 360
gctggcagcc tttyaataaa tcytaaagcc rgyrggtggg tttctycttt tcccctgctg 420
gctggtgact gttcagagac mccwcactga gttttgtgtg atgasatgtt ttccatcatt 480
ttttccttyc ttgaatcaga cttgtgaatt 510

<210> 74
<211> 458
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (382)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (388)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (424)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (448)
<223> n equals a,t,g, or c

<400> 74
gggtcgaccc acgcgtccgc tccacttaaa attcaacttc tgcttggttc atctgattct 60
ttcaaggtct taaatgttaa atgaaggggt aaaataggaa ggtatttaag taattagcag 120
gcctcctggg tcttgataac ttcagtgctt ctgggagctg cccggttggc caccagtctc 180
tgtggaatcc aggggcctct tcccaatatg gatttgacca gcacttcaat tagtgagttt 240
ccatkagcat cttagcatta ctctttaata cagacgcctt attttccagg gtttatgaaa 300
gtttaagtga caaccatgga ttgcaggaac agactgttga gaagctgttt ttccagtgga 360
aaagttgggt ccaggagatg angggagnct tgaaatagat cctgggatgg aaacataaag 420
tggncagcca gattcccatc atgggctncc ccataaaa 458

<210> 75
<211> 377
<212> DNA
<213> Homo sapiens

<400> 75

gtcctggaaa cacatcaagc tcagctcctg tgtccagctc gcttctctgc tggactcctt 60
gatttttttt ttaatcattg tttgattttg agcagtaacc aggctttttt ttccagatgt 120
tagtccacac ctattcatcc atggaccggc acgatggtgt cccgagccac agctcgcggc 180
tctcccagct gggctcggtg tcccaaggac cctactcgag cgccccgccg ctgtcccaca 240
ccccgtcgtc ggacttccag ccgccctact tcccamcccc ctaccagccg ctcccctamc 300
amcagagcca ggacccctac tcccacgtca amgamcccta tccctgaacc cactgcacca 360
gccccagcaa catccct 377

<210> 76
<211> 2070
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (20)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (39)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (88)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2068)
<223> n equals a,t,g, or c

<400> 76
tcatgaatgg gaatcctggn cccaagaact ccgcttgcng ccagagggac ctgcagctga 60
ggacctatag cgttgtgccc atgacctnca gtgtatccca gggcaccgcc gtgtgtaata 120
taaagattgg ctgacaaaaa tgtcaggaaa acatgatgtt ggagcttaca tgctaatgta 180
taagggcgct aatcgtactg aaacagtcac gtcttttaga aaacgagaaa gtaaagtgcc 240
tgctgatctc ttaaagcggg ccttcgtgag gatgagtaca agccctgagg ctttcctggc 300
gctccgctcc cacttcgcca gctctcacgc tctgatatgc atcagccact ggatcctcgg 360
gattggagac agacatctga acaactttat ggtggccatg gagactggcg gcgtgatcgg 420
gatcgacttt gggcatgcgt ttggatccgc tacacagttt ctgccagtcc ctgagttgat 480
gccttttcgg ctaactcgcc agtttatcaa tctgatgtta ccaatgaaag aaacgggcct 540
tatgtacagc atcatggtac acgcactccg ggccttccgc tcagaccctg gcctgctcac 600
caacaccatg gatgtgtttg tcaaggagcc ctcctttgat tggaaaaatt ttgaacagaa 660
aatgctgaaa aaaggagggt catggattca agaaataaat gttgctgaaa aaaattggta 720
cccccgacag aaaatatgtt acgctaagag aaagttagca ggtgccaatc cagcagtcat 780
tacttgtgat gagctactcc tgggtcatga gaaggcccct gccttcagag actatgtggc 840
tgtggcacga ggaagcaaag atcacaacat tcgtgcccaa gaaccagaga gtgggctttc 900
agaagagact caagtgaagt gcctgatgga ccaggcaaca gaccccaaca tccttggcag 960
aacctgggaa ggatgggagc cctggatgtg aggtctgtgg gagtctgcag atagaaagca 1020

ttacattgtt taaagaatct actatacttt ggttggcagc attccatgag ctgattttcc 1080
tgaaacacta aagagaaatg tcttttgtgc tacagtttcg tagcatgagt ttaaatcaag 1140
attatgatga gtaaatgtgt atgggttaaa tcaaagataa ggttatagta acatcaaaga 1200
ttaggtgagg tttatagaaa gatagatatc caggcttacc aaagtattaa gtcaagaata 1260
taatatgtga tcagctttca aagcatttac aagtgctgca agttagtgaa acagctgtct 1320
ccgtaaatgg aggaaatgtg gggaagcctt ggaatgccct tctggttctg gcacattgga 1380
aagcacactc agaaggcttc atcaccaaga ttttgggaga gtaaagctaa gtatagttga 1440
tgtaacattg tagaagcagc ataggaacaa taagaacaat aggtaaagct ataattatgg 1500
cttatattta gaaatgactg catttgatat tttaggatat ttttctaggt tttttccttt 1560
cattttattc tcttctagtt ttgacatttt atgatagatt tgctctctag aaggaaacgt 1620
ctttatttag gagggcaaaa attttggtca tagcattcac ttttgctatt ccaatctaca 1680
actggaagat acataaaagt gctttgcatt gaatttggga taacttcaaa aatcccatgg 1740
ttgttgttag ggatagtact aagcatttca gttccaggag aataaaagaa attcctattt 1800
gaaatgaatt cctcatttgg aggaaaaaaa gcatgcattc tagcacaaca agatgaaatt 1860
atggaataca aaagtggctc cttcccatgt gcagtccctg tccccccccg ccagtcctcc 1920
acacccaaac tgtttctgat tggcttttag ctttttgttg ttttttttt tccttctaac 1980
acttgtattt ggaggctctt ctgtgatttt gagaagtata ctcttgagtg tttaataaag 2040
tttttttcca aaaaaaaaaa aaaaaaantt 2070

<210> 77
<211> 997
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (619)
<223> n equals a,t,g, or c

<400> 77
ctcgccctcc tgactcttcc tgcaggtggc tcaggaagga ttcagcctgg ccacttggct 60
aggactctgc cagcacccat ctgagactga cctcttccgg gcctttggac actatgacct 120
tgatgctgcc cttcaggcag gaaacagggc tggtgccttt tttcacctgc atggccagct 180
tccttccctg gcagtggaga gggcagccaa caggttctaa tgtcagagcc atcctttacc 240
aggtgggcct gcttgtccct gtcttgcctg ccacatcact ctacttttg gaaggccatg 300
gctgattaaa gaagttcttg tagtttccca agcaaagtgg aatctagaaa cagtgaaaaa 360
agttcagata actttgaatt gcattcaaga agtacacttc tttcccattg tccgtggctc 420
ttggagtctc cgtgatgcca ggctagagtc tgattatata ataattcaaa atggtaactc 480
ccaaggtaat gctttcttcc atttcatcag gttcttttat ccccactgca ccccctcccc 540
ttctcccttg cctatctgga tggcttctca gaagctcggc cctagtcctc cctgccttgg 600
cgggggccag agcccactna ctgctgaggc agcactgctc tcgtcagctg tgttgccttt 660
amccaagtgt cttcagaggg ttatgagtta gagtagctgg cctggggaga gggtgcctcc 720
ctgggtttga tctttagggt ctgactttct gcagagaaga tgttttacag atgtgtcaaa 780
gctgatgtaa tgtggttggg ggaggaaatc cagacccaaa gtgtttgtca gctgggtgta 840
caactgccta tgtgatcctc tgtcttaaaa tgatttctgt ctgtgctgcg aaacaaagac 900
aaggtgaggt gtttttcttt tttgtaataa tataaagctg tgtgtttctg attggatgat 960
tcactatgtg cattgttccy cctaagtgct tttagta 997

<210> 78
<211> 1333
<212> DNA

<213> Homo sapiens

<220>
<221> misc feature
<222> (1254)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1297)
<223> n equals a,t,g, or c

<400> 78
gagaggagct gctgcgcgcc caggaagcgc cggggcaggc cgagccgccg gccgccgccg 60
aggtgcaggg ggctggcaac gaaaatgagc ctcgcgaggc cgacaagagc cacccggagc 120
agcgcragct tcggcctcgg ctctgtacca tgaagaaggg ccccagtggc tatggcttca 180
acctgcacag cgacaagtcc aagccaggcc agttcatccg gtcagtggac ccagactccc 240
cggctgaggc ttcagggctc cgggcccagg atcgcattgt ggaggtgaac ggggtctgca 300
tggaggggaa gcagcatggg gacgtggtgt ccgccatcag ggctggcggg gacgagacca 360
agctgctggt ggtggacagg gaaactgacg agttcttcaa gaaatgcaga gtgatcccat 420
ctcaggagca cctgaatggt cccctgcctg tgcccttcac caatggggag atacagaagg 480
agaacagtcg tgaagccctg gcagaggcag ccttggagag ccccaggcca gccctggtga 540
gatccgcctc cagtgacacc agcgaggagc tgaattccca agacagcccc ccaaaacagg 600
actccacagc gccctcgtct acctcctcct ccgaccccat cctagacttc aacatctccc 660
tggccatggc caaagagagg gcccaccaga aacgcagcag caaacgggcc ccgcagatgg 720
actggagcaa gaaaaacgaa ctcttcagca acctctgagc gccctgctgc cacccagtga 780
ctggcagggc cgagccagca ttccacccca ccttttcct tctccccaat tactcccctg 840
aatcaatgta caaatcagca cccacatccc ctttcttgac aaatgatttt tctagagaac 900
tatgttcttc cctgacttta gggaaggtga atgtgttccc gtcctcccgc agtcagaaag 960
gagactctgc ctccctcctc ctcactgagt gcctcatcct accgggtgtc cctttgccac 1020
cctgcctggg acatcgctgg aacctgcacc atgccaggat catgggacca ggcgagaggg 1080
caccctccct tcctccccca tgtgataaat gggtccaggg ctgatcaaag aactytgact 1140
gcagaactgc cgytctyagt ggacagggca tytgttatga cagacctktg gcagacacgt 1200
cttgttttca ttgatttttg ttaagagtgc agtattgcag agtctagagg aatntatgtt 1260
tccttgatta acatgatttc ctggttgtta catccanggc aggcagtggc tcagctttaa 1320
atttggtttc cta 1333

<210> 79
<211> 560
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (542)
<223> n equals a,t,g, or c

<400> 79
caatggggct gaggctgtgt ccactgaggc taagatgact gcctttcctg attggccttg 60
gcttttccat acattgtgtg acccttgccc tatgaccctt tggctgacct taccggaagc 120
catgacgaca gcagcctttt gccattagac gcagggtgat ggtgaggatt ccaagggtta 180

gacaaaactg gttaatctga actaggtgac tgttaccttg cgtgttttgt ggccaaacca 240
ccaccaaaaa cctcacactg tgatgtaagt acttagtgta aaactagtaa acatttttgt 300
aaaatgtaga aatgcatgta atcagttaag ttttatattt tacaatgttc tgtaaaataa 360
aacttagcga ggtaaatcga ataaaggagc agtcactctc taacagattg taggagaggt 420
ttagttggat ttagtctatt tgacttgccc ttaatttaat tttatggcaa atcacaaatg 480
tgtcgaaggt ttagcaatat aatagcaaag tcctactcca gtaaataaaa gttggtatgt 540
tngtacttaa ctttcaaaag 560

<210> 80
<211> 3203
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1116)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1443)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1942)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (3188)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (3201)
<223> n equals a,t,g, or c

<400> 80
cggtacgcgt gggtcgcggg cttcgggggt ctgcgctcgc ggctgcctgg actcagcagg 60
cccctggacc atgtcccgcg ccctgcggcc accgctcccg cctctctgct ttttcctttt 120
gttgctggcg gctgccggtg ctcgggccgg gggatacgag acatgcccca cagtgcagcc 180
gaacatgctg aacgtgcacc tgctgcctca cacacatgat gacgtgggct ggctcaaaac 240
cgtggaccag tacttttatg gaatcaagaa tgacatccag cacgccggtg tgcagtacat 300
cctggactcg gtcatctctg ccttgctggc agatcccacc cgtcgcttca tttacgtgga 360
gattgccttc ttctcccgtt ggtggcacca gcagacaaat gccacacagg aagtcgtgcg 420
agaccttgtg cgccaggggc gcctggagtt cgccaatggt ggctgggtga tgaacgatga 480
ggcagccacc cactacggtg ccatcgtgga ccagatgaca cttgggctgc gctttctgga 540
ggacacattt ggcaatgatg ggcgaccccg tgtggcctgg cacattgacc ccttcggcca 600
ctctcgggag caggcctcgc tgtttgcgca ratgggcttc gacggcttct tctttgggcg 660
ccttgattat caagataagt gggtacggat gcagaagctg gagatggagc aggtgtggcg 720

ggccagcacc agcctgaagc ccccgaccgc ggacctcttc actggtgtgc ttcccaatgg 780
ttacaacccg ccaaggaatc tgtgctggga tgtgctgtgt gtcgatcagc cgctggtgga 840
ggaccctcgc agccccgagt acaacgccaa ggagctggtc gattacttcc taaatgtggc 900
cactgcccag ggccggtatt accgcaccaa ccacactgtg atgaccatgg gctcggactt 960
ccaatatgag aatgccaaca tgtggttcaa gaaccttgac aagctcatcc rgctggtaaa 1020
tgcgcaaggc aaaaggaagc agtgtccatg ttctctactc cacccccgct tgttacctct 1080
gggagctgaa caaggccaac ctcacctggt cagtgnaaca tgacgacttc ttcccttacg 1140
cggatggccc ccaccagttc tggaccggtt acttttccag tcggccggcc ctcaaacgct 1200
acgagcgcct cagctacaac ttcctgcagg tgtgcaacca gctggaggcg ctggtgggcc 1260
tggcggccaa cgtgggaccc tatggctccg gagacagtgc acccctcaat gaggcgatgg 1320
ctgtgctcca gcatcacgac gccgtcagcg gcacctcccg ccagcacgtg gccaacgact 1380
acgcgcgcca stttgcggca ggctgggggc cttgcgaggt tcttctgagc aacgcctggc 1440
gcngctcaga ggcttcaaag atcacttcac cttttgccaa cagctaaaca tcagcatctg 1500
cccgctcagc cagacggcgg cgcgcttcca ggtcatcgtt tataatcccc tggggcggaa 1560
ggtgaattgg atggtacggc tgccggtcag cgaaggcgtt ttcgttgtga aggaccccaa 1620
tggcaggaca gtgcccagcg atgtggtaat atttcccagc tcagacagcc aggcgcaccc 1680
tccggagctg ctgttctcag cctcactgcc cgccctgggc ttcagcacct attcagtagc 1740
ccaggtgcct cgctggaagc cccaggcccg cgcaccacag cccatcccca gaagatcctg 1800
gtcccctgct ttaaccatcg aaaatgagca catccgggca acgtttgatc ctgacacagg 1860
gctgttgatg gagattatga acatgaatca gcaactcctg ctgcctgttc gccagacctt 1920
cttctggtac aacgccagta tnaggtgaca acgaaagtga ccaggcctca ggtgcctaca 1980
tcttcagacc caaccaacag aaaccgctgc ctgtgagccg ctgggctcag atccacctgg 2040
tgaagacacc cttggtgcag gaggtgcacc agaacttctc agcttggtgt tcccaggtgg 2100
ttcgcctgta cccaggacag cggcacctgg agctagagtg gtcggtgggg ccgatacctg 2160
tgggcgacac ctgggggaag gaggtcatca gccgttttga cacaccgctg gagacaaagg 2220
gacgcttcta cacagacagc aatggccggg agatcctgga gaggaggcgg gattatcgac 2280
ccacctggaa actgaaccag acggagcccg tggcaggaaa ctactatcca gtcaacaccc 2340
ggatttacat cacggatgga aacatgcagc tgactgtgct gactgaccgc tcccaggggg 2400
gcagcagcct gagagatggc tcgctggagc tcatggtgca ccgaagctgc tgaaggacga 2460
tggacgcgga gtatcggagc cactaatgga gaacgggtcg ggggcgtggg tgcgagggcg 2520
ccacctggtg ctgctggaca cagcccaggc tgcagccgcc ggacaccggc tcctggcgga 2580
gcaggaggtc ctggcccctc aggtggtgct ggccccgggt ggcggcgccg cctacaatct 2640
cggggctcct ccgcgcacgc agttctcagg gctgcgcagg gacctgccgc cctcggtgca 2700
cctgctcacg ctggccagct ggggccccga aatggtgctg ctgcgcttgg agcaccagtt 2760
tgccgtagga gaggattccg gacgtaacct gagcgccccc gttaccttga acttgaggga 2820
cctgttctcc accttcacca tcacccgcct gcaggagacc acgctggtgg ccaaccagct 2880
ccgcgaggca gcctccaggc tcaagtggac aacaaacaca ggccccacac cccaccaaac 2940
tccgtaccag ctggacccgg ccaacatcac gctggaaccc atggaaatcc gcactttcct 3000
ggcctcagtt caatggaagg aggtggatgg ttaggtctgc tgggatgggc cctccaagcc 3060
caagcctcct gctccggggg cagaccagac tctgactctc ctcttgggct gctgccatta 3120
aaacgctact actaagaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 3180
aaatttanaa aaaaaaaaaa naa 3203

<210> 81
<211> 1710
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1424)

<223> n equals a,t,g, or c

<400> 81
aagagccgaa cggataagag aagaggaggg cgcgkatggc gtcggggcgc cccgaggagc 60
tgtgggaggc cgtggtgggg gccgctgagc gcttccgggc ccggactggc acggagctgg 120
tgctgctgac cgcggccccg ccgcaccacc ccgcccgggc ccctgtgcct atgctgccca 180
tggtcgagga gccctggcgg aggcagcgcg ccgttgcctc cacgacatcg cactggccca 240
cagggctgcc actgctgctc ggcctcctgc gcccccacca gcaccacagc cacccagtcc 300
cacacccagc ccaccccggc ctaccctggc cagagaggac aacgaggagg acgaggatga 360
gcccacagag acagagacct ccggggagca gctgggcatt agtgataatg gagggctctt 420
tgtgatggat gaggacgcca ccctccagga ccttcccccc ttctgtgagt cagaccccga 480
gagtacagat gatggcagcc tgagcgagga gacccccgcc ggccccccca cctgctcagt 540
gcccccagcc tcagccctac ccacacagca gtacgccaag tccctgcctg tgtctgtgcc 600
cgtytggggc ttcaaggaga agaggacaga ggcgcggtca tcagatgagg agaatgggcc 660
gccctcttcg cccgacctgg accgcatcgc ggcgagcatg cgcgcgctgg tgctgcgaga 720
ggccgaggac acccaggtct tcggggacct gccacggccg cggcttaaca ccagcgactt 780
ccagaagctg aagcggaaat attgaagtcc agggagggag cgccccgggc cgcgtccgcc 840
ccgtcccaca ctacgccccc gccccactcc cggggcctgc taatctgagg ccgatccggg 900
accggcctcc ttgcgtctcc cattcccaag attgtcccgc ctctgccaat ccccgccgtc 960
cttccagccc acgacctgcc gcgccgagga gcggcwtctg tcccgtttcc cgattgggtc 1020
tgtcgtctct ctccgcctag cgacagattc cttctattaa gggattggct cgctgagttc 1080
taagctctaa atgggtcaac tcctttgttt tccgcctagc gacaagggat ttgctcgcac 1140
ggcattggct ccatccccta gtcgctggac agctcttttt ttgattggct caaatcctgt 1200
aaagggcttg accagtctct acatagtcac cgtccgcttt tcctgagttc tccctcccaa 1260
ttggctccag cttcctgggg gcgtggccaa gccctcctct tcccagaatt ggcccggggc 1320
cttcaattta cgttctttac actacgggga ctggggtcgt ctttgcccac gtcccgacaa 1380
cttgttccct gacccccтca gggatggccc caaactgtcc ctgnctctgg cacccccttt 1440
cattggttcc atccatcccc acaacagcct gccaatcgaa gcccgtccct gcatccagga 1500
tggtaccagc tcccgccccт cgccccccac ctccacaggt gccttaaagg gccctcgtca 1560
cccaaggtgg gggcaggggc cctcactctc cggccctggt gtgggggaga gagtgagggg 1620
ttgggggatc ggcagttggg aggggcgctc tgagattaaa gagttttacc tctgagataa 1680
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1710

<210> 82
<211> 1379
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (280)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1365)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1378)

<223> n equals a,t,g, or c

<400> 82
aattcggcag agctgagccc cgggctgtgc agtccgacgc cgactgaggc acgagcgggt 60
gacgctgggc ctgcagcgcg gagcagaaag cagaacccgc agagtcctcc ctgctgctgt 120
gtggacgaca cgtgggcaca ggcagaagtg ggccctgtga ccagctgcac tggtttcgtg 180
gaaggaagct ccaggactgg cgggatgggc tcagcctgta tcaaagtcac caaatacttt 240
ctcttcctct tcaacttgat cttctttatc ctgggcgcan tgatcctggg cttcggggtg 300
tggatcctgg ccgacaagag cagtttcatc tctgtcctgc aaacctcctc cagctcgctt 360
aggatggggg cctatgtctt catcggcgtg ggggcagtca ctatgctcat gggcttcctg 420
ggctgcatcg gcgccgtcaa cgargtccgc tgcctgctgg ggctgtamtt tgctttcctg 480
ctcctgatcc tcattgccca rgtgacggcc ggggccctct tctacttcaa catgggcaag 540
gtaagcccct ctctccctcc ctcttcactg ggctggacca accatggggg tgattgactg 600
agtgtggggg atggacaagg aacccccca gttgtcacag acagatccag taggtgtcag 660
ggacggcctc ctggacacta ttccttgtga atcaaatggg ggagcgttag aagagaaggc 720
ggcaggtgtr ggcagtcccc gctgggcctg gwtcttagcc tgacccccct gctttctagc 780
tgtgtggcct tgggcaagct gcttgcctct atgtgcctgt tccaccatct gtgaaaatgg 840
aaacaataag aaaactgaac tctcagagtg gttgcaaaga ttattcgaga ttatctgagt 900
gaaacacata gcgcatggca ccataagtac tcaataaatg ttattcttgt tattattaag 960
rtactttagc aactattaaa tccatgccac tcacccacaa atgaggttta gaaggagacc 1020
gttaataaaa acatcagtct tgtgtccgag gggagatgtt cagctttcag aaacagaaaa 1080
tcagacttac agcggcttaa agttgaagga catctgtggt tgacttgacc ggaagtctgg 1140
tttggaagct cagaggccct ggttctggct gttgagcatc ctcgctggga tggctttcct 1200
gcattatgac acttacctcg tggttccaag atggctgcca cagcaccagg cacgatgtct 1260
gtgccgctgt ggcctgaaga tggggaagtg ggcagtgcca gacatggcca tccctttat 1320
ccagaaaagg cgcagtggct catgactgta atccccaata cttanggaag cagaagtng 1379

<210> 83
<211> 678
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (602)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (626)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (648)
<223> n equals a,t,g, or c

<400> 83
gcaagagcgg aagaaagcgg ctggtacccc ggaagcagtc gctgcaactt ccgggaggtg 60
cttgtgtgcc tggtgcggga gctacggggc ccagggattg tgtttaaagt agtgcttcta 120
ccaacatgtc ccgtggttcc agcgccggtt ttgaccgcca cattaccatt ttttcacccg 180

agggtcggct ctaccaagta gaatatgctt ttaaggctat taaccagggt ggccttacat 240
cagtagctgt cagagggaaa gactgtgcag taattgtcac acagaagaaa gtacctgaca 300
aattattgga ttccagcaca gtgactcact tattcaagat aactgaaaac attggttgtg 360
tgatgaccgg aatgacagct gacagcagat cccaggtaca gagggcacgc tatgaggcag 420
ctaactggaa atacaagtat ggctatgaga ttcctgtgga catgctgtgt aaaagaattg 480
ccgatatttc tcaggtctac acacagaatg ctgaaatgag gcctcttggt tgttgtatga 540
ttttaattgg tatagatgaa gagcaaggcc ctcaggtata taagtgtgat cctgcaggtt 600
antactgtgg ggtttaaagc cactgnagcg ggagttaaac aaactggngt caaccagctt 660
ccttgaaaaa aaagtgga 678

<210> 84
<211> 2803
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (10)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (50)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (517)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (572)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1926)
<223> n equals a,t,g, or c

<400> 84
caacatgagn aatccttctc ctccctctgg ctggcttgga aatscaaaan ctcytcgcaa 60
cgtcccgcaa raatctggtt gctctgccgg atggcatctc ggagctcttg attctcctcc 120
aggcarcgct ggagggtctc aggagcgccc tgttctgaag gcaggtgcag catggctggc 180
ttccccagag gagactcttc gcccagtacg tcctgatctg ctgccgggcc accactgggc 240
tgcaccatct cacacagttg gctcttccag aggtgcctat tcatccaaca gggcaagggc 300
tgtcagcaga gtccgtcaga cgtgagaagg gtgggagcgg cggactgtga acgctggtag 360
ggccccggcg ctccgagaaa gtcccagttt cgcggtcgcc cttcctacc acgcttccgg 420
cttccggtgt catagctgtg ggatccggaa gtaaaaacac aagccccgcs cccrrgaact 480
cgggaagccg gcgakaagtg tgaggccgcg gtagggncgc atcccgctcc ggagagaagt 540
ctgagtccgc cagctctgca ggcccgcgga antcgacagc gtcatggcag agcaggtggc 600

cctgagccgg acccaggtgt gcgggatcct gcgggaagag cttttccagg gcgatgcctt 660
ccatcagtcg gatacacaca tattcatcat catgggtgca tcgggtgacc tggccaagaa 720
gaagatctac cccaccatct ggtggctgtt ccgggatggc cttctgcccg aaaacacctt 780
catcgtgggc tatgcccgtt cccgcctcac agtggctgac atccgcaaac agagtgagcc 840
cttcttcaag gccaccccag aggagaagct caagctggag gacttctttg cccgcaactc 900
ctatgtggct ggccagtacg atgatgcagc ctcctaccag cgcctcaaca gccacatgaa 960
tgccctccac ctggggtcac aggccaaccg cctcttctac ctggccttgc ccccgaccgt 1020
ctacgaggcc gtcaccaaga acattcacga gtcctgcatg agccagatag gctggaaccg 1080
catcatcgtg gagaagccct tcgggaggga cctgcagagc tctgaccggc tgtccaacca 1140
catctcctcc ctgttccgtg aggaccagat ctaccgcatc gaccactacc tgggcaagga 1200
gatggtgcag aacctcatgg tgctgagatt tgccaacagg atcttcggcc ccatctggaa 1260
ccgggacaac atcgcctgcg ttatcctcac cttcaaggag ccctttggca ctgagggtcg 1320
cgggggctat ttcgatgaat ttgggatcat ccgggacgtg atgcagaacc acctactgca 1380
gatgctgtgt ctggtggcca tggagaagcc cgcctccacc aactcagatg acgtccgtga 1440
tgagaaggtc aaggtgttga aatgcatctc agaggtgcag gccaacaatg tggtcctggg 1500
ccagtacgtg gggaaccccg atggagaggg cgaggccacc aaagggtacc tggacgaccc 1560
cacggtgccc cgcgggtcca ccaccgccac ttttgcagcc gtcgtcctct atgtggagaa 1620
tgagargtgg gatggggtgc ccttcatcct gcgctgcggc aaggccctga acgagcgcaa 1680
ggccgaggtg aggctgcagt tccatgatgt ggccggcgac atcttccacc agcagtgcaa 1740
gcgcaacgag ctggtgatcc gcgtgcagcc caacgaggcc gtgtacacca agatgatgac 1800
caagaagccg ggcatgttct tcaaccccga ggagtcggag ctggacctga cctacggcaa 1860
cagatacaag aacgtgaagc tccctgacgc ctacgagcgc ctcatcctgg acgtcttctg 1920
cgggganccag atgcacttcg tgcgcaggac gagctccgtg aggcctggcg tattttcacc 1980
ccactgctgc accagattga gctggagaag cccaagccca tcccctatat ttatggcagc 2040
cgaggcccca cggaggcaga cgagctgatg aagagagtgg gtttccagta tgagggcacc 2100
tacaagtggg tgaaccccca caagctctga gccctgggca cccacctcca cccccgccac 2160
ggccaccctc cttcccgccg cccgaccccg agtcgggagg actccgggac cattgacctc 2220
agctgcacat tcctggcccc gggctctggc caccctggcc cgcccctcgc tgctgctact 2280
acccgagccc agctacattc ctcagctgcc aagcactcga gaccatcctg gcccctccag 2340
accctgcctg agcccaggag ctgagtcacc tcctccactc actccagccc aacagaagga 2400
aggaggaggg cgcccattcg tctgtcccag agcttattgg ccactgggtc tcactcctga 2460
gtggggccag ggtgggaggg agggacaagg gggaggaaag gggcgagcac ccacgtgaga 2520
gaatctgcct gtggccttgc ccgccagcct cagtgccact tgacattcct tgtcaccagc 2580
aacatctcga gccccctgga tgtcccctgt cccaccaact ctgcactcca tggccacccc 2640
gtgccacccg taggcagcct ctctgctata agaaaagcag acgcagcagc tgggacccct 2700
cccaacctca atgccctgcc attaaatccg caaacagcca aaaaaaaaaa aaaaaaaaaa 2760
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aag 2803

<210> 85
<211> 1278
<212> DNA
<213> Homo sapiens

<400> 85
tcgacccacg cgtccgcaag aagctttttg agggcctgaa gttcttcctg aaccgagagt 60
gccccgtgag gccctggcct tcatcatcag gagttttggt ggggaagtgt cctgggacaa 120
atctttgtgc attggggcca cctatgacgt cacagactcc cgcatcaccc atcagattgt 180
cgaccggcct gggcagcaga cctcagtcat tggcaggtgc tacgtgcagc cccagtrggt 240
gtttgactca gtgaacgcca ggctccttct ccccgtggca gagtacttct ctggggtgca 300
gctgccccca cacctttcac cctttgtgac cgagaaggaa ggagattacg ttccacctga 360
gaagctgaag ctgctggctc tgcagcgggg agaggaccca ggaaacctga atgagtcaga 420

agaggaggag gaagaggacg acaacaacga aggtgatggt gatgaagagg gagaaaatga 480
ggaggaggag gaagatgcag aggctggttc agaaaaggag gaagaggccc ggctggcagc 540
cctggaagag cagaggatgg aggggaagaa gcccagggtg atggcaggca ccttgaagct 600
ggaggataag cagcggctgg cccaggagga ggagagtgag gccaagcgcc tggccattat 660
gatgatgaag aagcgggaga agtacctgta ccagaagatc atgtttggca agaggcgaaa 720
aatccgagag gccaacaagc tggcggagaa gcggaaagcc cacgatgagg cggtgaggtc 780
tgagaagaag gccaagaagg caaggccgga gtgagtgcct gcggcccctc acagggctga 840
ggccagcccc tagcagctgg atgtggcaga ggcaggccag aggacctaag tgtgatggac 900
cagagtcact tctcctcctc ctttctccag ccagccctga cccctcatgc tctctggctg 960
ggccagtggg cagccctcgc ttcccttgga tggagctgcc ctgctggtgc ctggtcagag 1020
aagaggcctc tgtgcccagc ctgattctct gctcccagga gccagtgaca tgaggtgcag 1080
aggcccaccc agccccctac ctactgcccc cattcatcct ggctttccac agccccctcc 1140
cacacagttg gacccgtgat tctcagggtg ctgtgatggg gtgagggtag ggggagcatt 1200
tgttattaaa tgactggact tttgtgccaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1260
aaaaaaccca cgcgtccg 1278

<210> 86
<211> 2585
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (2573)
<223> n equals a,t,g, or c

<400> 86
tcgacccacg cgtccgcggg ctatttgttg gagcccaagc ctggtggtgg gccttcaaga 60
accccggagt gtccccttg gctcgattcc caggaaactc ctcctcaacc cctttggcat 120
cagcattaca agccaaagcc tcaatccagg gccctttcgt actcctaaag cagggataag 180
gacctatcac ttccgctcca ccttggccga gttccaggtt ataatgggca ggaagagagg 240
aaatgtggaa aagggctggt tggcaaagct gggaccagat ggtgcagctt tcctgcagat 300
tcccgcagaa gagatccctg cctacatgtc tgtgcatcga ctcctgagga agctgctaag 360
tcgatatcgg cttccagtag caacccgaga gaaccctgtt atcaatgact gctgcagagg 420
tgctatgctt tccctggcca caggctggcc cactctggaa gcgacctctc tctgttagtc 480
ccagaaattg aagatatgta cagcagcccc tatctgcgcc cctcagaatc tcctatcacc 540
gtcgaggtca actgcaccaa tccaggcacc agatattgct ggatgagtac tgggctctac 600
atacctggaa ggcaaattat agaagtctca ctgcctgaag ctgctgcctc tgccgacctg 660
aagatacaga ttggctgcca cacagatgac ctgaccaggg ccagcaagct tttccgaggc 720
ccactcgtaa ttaaccggtg ctgcttggac aaacccacaa aatcgatcac gtgcctctgg 780
ggtggactcc tctatataat tgtgcctcag aacagcaaac tgggttctgt gcctgtcacc 840
gtgaaggggg ctgtgcatgc tccatactac aagctggggg agaccaccct ggaggagtgg 900
aagaggcgta tccaggagaa tccagggccc tggggagagc tggccacgga caacatcatt 960
ctgaccgtgc cgaccgcaaa tcttcgtact ctggagaacc ctgagccgct gctccgcctc 1020
tgggatgagg tgatgcaggc tgtggcgcga ctgggagctg agcccttccc tttgcgcctg 1080
cctcagagga ttgttgccga cgtgcagatc tcagtgggct ggatgcatgc agggtacccc 1140
atcatgtgcc atctggagtc agtgcaggar ctcatcaacg agaagctcat cagaaccaag 1200
gggctgtggg gccccgtcca tgagctgggc cgcaaccagc agcggcagga gtgggagttc 1260
ccaccacaca ccaccgaggc camctgcaac ctgtggtgtg tgtatgtgca tgagacggtc 1320
ttgggcattc ctcgaagccg tgccaatatt gctctgtggc ccccagttcg ggagaagaga 1380
gtcagaatct acctgagcaa gggtcccaat gtgaaaaact ggaatgcatg gmccgcactg 1440

gaaacgtatt tacagctcca ggaagccttt ggttgggagc cattcatccg tctcttcacc 1500
gagtacagga accagaccaa cttgcccaca gaaaatgttg acaaaatgaa tctgtgggtc 1560
aagatgttct cccaccaagt gcagaagaac ctggctccgt tctttgaggc ctgggctggc 1620
ccatccagaa ggaagtggct accagcctgg cctatctgcc tgaatggaag gaaaatatta 1680
tgaaattgta cctcctcaca cagatgcccc actgaaattg aagtcaagaa atgcaaaaag 1740
gaactgagca catctcagca aagaaaactg aagggatttg gttataagtg gagaggatct 1800
cagcatattt ctggaagata gaaagtggat gaagcatgat aatgaaagag tgaagaacct 1860
ttcagataaa atgtaagctg atctgaacaa cataacccca aagagacttg cgcacctgaa 1920
aagcttgtct actgaagaat tactccagtt gtaagattga gccctctcct actctccccc 1980
aactcttatg cacagaacac aggcagtctc cactattgat accagttaaa aatttcttgt 2040
tattgttgct gttgttgttt gtataaagga attgaacagg ctgcttgcag agagataaga 2100
gttggtgctc cagaaaaaaa tttctcttct agtggaaata agtgccccta cccccagccg 2160
gtcagctaat tctctactga cagctgagac ctcctactca agtgcctgtt gccttcaggt 2220
atagaagagg tttcctgaag aaacagacct aactgtacaa cagcagagga aacccatgcc 2280
aactgttata caagttaaca gttatgttga ttcttaaatg gggaatggtg agttagaaat 2340
tcccagacat gggcgatggg gagggaagag grataaggaa aagtcacgag gtaggawtta 2400
gggggccttg aaaatatgac aaactctgag gggaaacaaa grcmatktgg gaaagawtaa 2460
cttaatttta attccatctc cagagagatt tgaggtgtat ttaagatgaa aaacaggata 2520
ctacaaagaa acgggaaaac tcaggggttc aagaccagcc taggcaagat ggnaaaaaac 2580
ccccc 2585

<210> 87
<211> 385
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (385)
<223> n equals a,t,g, or c

<400> 87
gggtcgaccc acgcgtccgc atgaatttgt cacaatctta tcaataatca ttactctgtt 60
ttttatattt caactaaaag tatcaaaata tagctttcca gaaaaccccg aaccaaagtc 120
actgactaca tcaaagtcta ctacaccttg agaaaacaaa tgaacgaaaa tctattttcc 180
tcattcatta ccccaacaat aataggactc cctatcgtaa ttattatcac tatgtttcca 240
agcattatat tcccatcacc tacccgactr aatcaataat cgactscatc tccattccaa 300
caatgattag tgcactgaac atscaaaaca aatrttgatc catgccacaa ccaaaaagga 360
caaactggag cccggatatt gatan 385

<210> 88
<211> 2500
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (429)
<223> n equals a,t,g, or c

<220>

<221> misc feature
<222> (1088)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2480)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2482)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2491)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2497)
<223> n equals a,t,g, or c

<400> 88
tcgacccacg cgtccgccca cgcgtccgtc tccaccgctg ctgccgccgc cctggccgcc 60
gccgcagtga aagctaagca cttggctgct gttgaggaaa ggaagatcaa atctttggtg 120
gccctgctgg tggagaccca gatgaaaaag ttggagatca aacttcggca ctttgaggag 180
ctggagacta tcatggaccg ggagcragaa gcactggagt atcagaggca gcagctcctg 240
gccgacagac aagccttcca catggagcag ctgaagtatg cggagatgag ggctcggcag 300
cagcacttcc aacagatgca ccaacagcag cagcagccac caccagccct gcccccaggc 360
tcccagccta tccccccaac aggggctgct gggccacccg caktccatgg cttggctgtg 420
gctccagcnt ctgtagtccc tgctcctgct ggcagtgggg cccctccagg aagtttgggc 480
ccttctgaac agattgggca ggcagggtca actgcagggc cacagcagca gcaaccagct 540
ggagcccccc agcctggggc agtcccacca ggggttcccc cccctggacc ccatggcccc 600
tcaccgttcc ccaaccaaca aactcctccc tcaatgatgc caggggcagt gccaggcagc 660
gggcacccag gcgtggcggg taatgctcct ttgggtttgc cttttggcat gccgcctcct 720
cctcctcctc ctgctccatc catcatccca tttggtagtc tagctgactc catcagtatt 780
aacctccccg ctcctcctaa cctgcatggg catcaccacc atctcccgtt cgccccgggc 840
actctccccc cacctaacct gcctgtgtcc atggcgaacc ctctacatcc taacctgccg 900
gcgaccacca ccatgccatc ttccttgcct ctcgggccgg ggctcggatc cgccgcagcc 960
caaagccctg ccattgtggc agctgttcag ggcaacctcc tgcccagtgc cagcccactg 1020
ccagacccag gcacccccct gcctccagac cccacagccc cgagccccag gcacggtcac 1080
ccctgtgncc acctccacag tgaggagcca gccagacatc tctccccctc acccccctgtg 1140
gacatcacgg ttccaggaac agcccttccc ccaccactgg gaccctcccc agcctggaga 1200
gttcatcact acgtaaggaa agctccttcc gcccctccaa agccctcacc atgcctaaca 1260
gaggcatgca tttttatatc agattattca aggacttctg tttaaaagat gtttataatg 1320
tctgggagag aggataggat gggaatgctg ccctaaagga agggctggtg aaaggtgttt 1380
atacaaggtt ctattaacca cttctaaggg tacacctccc tccaaactac tgcattttct 1440
atggattaaa aaaaaaaaaa aaagtagatt ttaaaaagcc acattggagc tcccttctac 1500
ccactaaaaa ataaccaatt tttacatttt ttgaggggga gtgagtttta ggaaagggga 1560

attaagattc cagggagagc tctggggata gaacagggcg cagattccat ctctccccaa 1620
gccccttttt agtgactaag tcaaggcccc aactcccctc ccccacccta cgctgagctt 1680
attcgagttc attcgtacta ataatccctc ctgcggcttc ctcattgttg ctgttttagg 1740
ccaccccagc tcagccaatg attcctttcc ctctgaatgt cagttttgtt tttaaaagtc 1800
acttgcttag ttgatgtcag cgtatgtgta tttggtgggg aaaacctaat ttcggggatt 1860
tctgtggtag gtaataggag aagaaagggc actgggggct gttctccttc cttccctggg 1920
ctgtatccat ggactcctgg aaggcacaga gaagggagct ataagaggat gtgaagtttt 1980
aaaacctgaa attgtttttt aaagcactta agcacctcca tattatgact tggtgggtca 2040
ccccttagct tcctccctct cccaccaaga ctatgagaac ttcagctgat agctgggggc 2100
tccccagatg aggatgcagg gatttgggag cagtggaaga gggtgcccaa ccttgggttg 2160
gaccaaccct tggctcgcag ctcaactctg cttcccgcat tcctgctcca cgtgtcccag 2220
cttctccccc gtgacgggaa ggcaggtgtg actccaggct ctgcactggt tcttcttggt 2280
tcctcccacc aggccctttg ttcctcatgt ccccatgttt ctctccctct gcgtcttagc 2340
acctttcttc tgttcaaagt tttctgtaaa ttttctcttt ttttctttct ttctttttt 2400
tttttttata aattaatttg ctttcagttc caaaaaaaaa aaaaaaaaaa aaaaaaaaaa 2460
aaaaaaaaaa aaaaaaaaan tngaggggggg ncccggnacc 2500

<210> 89
<211> 1409
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (841)
<223> n equals a,t,g, or c

<400> 89
aggagtatgt atttcccgcc aagaagaagc tgcaggaata ccgggtctta attaccaccc 60
tcatcactgc cggcagttgg tctcggccca gtttcccatt gatcacttca cacacatctt 120
catcgatgag gctggccact gcatggagcc tgagaagtct ggtagctata gcagggctga 180
tggaagtaaa ggaaacaggt gatccaggag ggcagctggt gctggcagga gaccctcggc 240
agctggggcc tgtgctgcgt tccccactga cccagaagca tggactggga tactcactgc 300
tggarcggct gctcacctac aactccctgt acaagaaggg ccctgatggc tatgacccca 360
agttcataac caagctgctc cgcaactaca ggtctcatcc caccatcctg gacattccta 420
accagctcta ttatgaaggg gagctgcagg cctgtgctga tgtcgtggat cgagaacgct 480
tctgccgctg ggcggsccta cctcgacagg gctttcccat catctttcac ggcgtaatgg 540
gcaaagatga gcgtgaaggc aacagcccat ccttcttcaa ccctgaagag gctgccacag 600
tgacttccta cctgaagctg ctcctggccc cctcctccaa gaagggcaaa gctcgcctga 660
gccctcgaag tgtgggcgtc atctccccgt accggaaaca ggtggagaaa atccgttact 720
gcatcaccaa acttgacagg gagcttcgag gactggatga catcaaggac ttgaaggtgg 780
gttcagtaga agaattccaa ggccaagaac gaagcgtcat cctcatctcc accgtgcgaa 840
nagccagagc tttgtgcagc tggatctgga ctttaatctg ggtttcctta agaaccccaa 900
gaggttcaat gtagctgtga cccgggccaa ggcctgctca tcatcgtggg gaacccccct 960
ctcctgggcc atgaccctga ctggaaagta ttcctggagt tctgtaaaga aaacggaggg 1020
tataccgggt gtcccttccc tgccaaactg gacctgcaac agggacagaa tttactgcaa 1080
ggtctgagca agctcagccc ctctacctca gggccccaca gycatgacta cctcccccag 1140
gagcgggagg gtgaaggggg cctgtctctg caagtggagc cagagtggag gaatgagctc 1200
tgaagacaca gcacccagcc ttctcgcacc agccaagcct taactgcctg cctgaccctg 1260
aaccagaacc cagctgaact gcccctccaa gggacaggaa ggctggggga gggagtttac 1320
aacccaagcc attycaccck cctccctgct ggggagaatg acacatcaag ctgctaacaa 1380

ttgggggaag gggaaggaag aaaactctg 1409

<210> 90
<211> 1336
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (49)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1284)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1317)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1333)
<223> n equals a,t,g, or c

<400> 90
agaacagtac ctccctctca ctgaggaaga actagaaaaa gaagcaaana aagttgaagg 60
atttgatctg gttcagaagc caagttatta tgttagactg ggatccctgt ctaccaagct 120
tcactcccgt gcctaccagc aggctctcag cagggttaaa gaagctaagc aaaaaagcca 180
acagaccatt tctcagctcc attctactgt tcacctgatt gaatttgcca ggaagaatgt 240
gtatagtgcc aatcagaaaa ttcaggatgc tcaggataag ctctacctct catgggtaga 300
gtggaaaagg agcattggat atgatgatac tgatgagtcc cactgtgctg agcacattga 360
gtcacgtact cttgcaattg cccgcaacct gactcagcag ctccagacca cgtgccacac 420
cctcctgtcc aacatccaag gtgtaccaca gaacatccaa gatcaagcca agcacatggg 480
ggtgatggca ggcgacatct actcagtgtt ccgcaatgct gcctccttta aagaagtgtc 540
tgacagcctc ctcacttcta gcaaggggca gctgcagaaa atgaaggaat ctttagatga 600
cgtgatggat tatcttgtta acaacacgcc cctcaactgg ctggtaggtc ccttttatcc 660
tcagctgact gagtctcaga atgctcagga ccaaggtgca gagatggaca agagcagcca 720
ggagacccag cgatctgagc ataaaactca ttaaacctgc ccctatcact agtgcatgct 780
gtggccagac agatgacacc ttttgttatg ttgaaattaa cttgctaggc aaccctaaat 840
tgggaagcaa gtagctagta taaaggccct caattgtagt tgtttccagc tgaattaaga 900
gctttaaagt ttctggcatt agcagatgat ttctgttcac ctggtaagaa aagaatgata 960
ggcttgtcag agcctatagc cagaactcag aaaaaattca aatgcactta tgttctcatt 1020
ctatggccat tgtgttgcct ctgttactgt ttgtattgaa taaaaacatc ttcatgtggg 1080
ctggggtaga aactggtgtc tgctctggtg tgatctgaaa aggcgtcttc actgctttat 1140
ctcatgatgc ttgcttgtaa aacttgattt tagtttttca tttctcaaat aggaatacta 1200
cctttgaatt caataaaatt cactgcagga tagaccagtt aaaaaaaaaa aaaaaaaaaa 1260
aaaaggggggg ccgcccaagg grtnccccccg agggggggccc cagctttacg cgtggcntgc 1320
gacgtccaaa gcnccc 1336

<210> 91
<211> 787
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (677)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (725)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (742)
<223> n equals a,t,g, or c

<400> 91
ggcacgagct gtggggctgt gggcctgtta cccccaggcg cacagctccc tccggctggg 60
cccaggctcc actcagtgac acggctcaag tctacatgga gctgcagggc ctggtggacc 120
cgcagatcca gctacctctg ttagccgccc gaagtacaag ttgcagaagc agcttgatag 180
cctcacagcc aggaccccat cagaagggga ggcagggact cagaggcaac aaaagctttc 240
ttccctccag ctggaattgt caaaactgga caaggcagcc tctcacctcc rgcagctgat 300
ggatgagcct ccagccccag ggagcccgga gctctaactc atcatcccca tcagttttcc 360
tccctctcag acctgtcttt gaggacaaac agatttgtca gctgtcaggg tgcagtggga 420
cgtcagagac tatgtggtcc atcgccttca ttgtgtaaat gaggacacag actggcttgg 480
tcgcagtgac tgtggtgtcc ttgagatgct cacattactg cccggcctgc ctcccacctg 540
gaagtctggg aatgaggaga ttgagataaa cttttgaaat cccaaacatg tctgtttatg 600
gctctttggt ccccttgct cccagtggtg acttttgtgc ttctgagttg tcccctgaga 660
gcttggtctg ggaaaanagg aaggaagggg tcctcactgg aggaagagga acctttctaa 720
gtcangggta aggggaatgg gnacagttgg ttcccggttc taacctcctt ttctggactg 780
acaagtg 787

<210> 92
<211> 1657
<212> DNA
<213> Homo sapiens

<400> 92
cgcgtccgcc cacgcgtccg cccacgcgtc cggctactca gaggaagggg cggttggtgc 60
ggcctccatt gttcgtgttt taaggcgcca tgaggggtga cagaggccgt ggtcgtggtg 120
ggcgctttgg ttccagagga ggcccaggag gagggttcag gccctttgta ccacatatcc 180
catttgactt ctatttgtgt gaaatggcct ttccccgggt caagccagca cctgatgaaa 240
cttccttcag tgaggccttg ctgaagagga atcaggacct ggctcccaat tctgctgaac 300
aggcatctat cctttctctg gtgacaaaaa taaacaatgt gattgataat ctgattgtgg 360
ctccagggac atttgaagtg caaattgaag aagttcgaca ggtgggatcc tataaaaagg 420
ggacaatgac tacaggacac aatgtggctg acctggtggt gatactcaag attctgccaa 480

cgttggaagc tgttgctgcc ctggggaaca aagtcgtgga aagcctaaga gcacaggatc 540
cttctgaagt tttaaccatg ctgaccaacg aaactggctt tgaaatcagt tcttctgatg 600
ctacagtgaa gattctcatt acaacagtgc cacccaatct tcgaaaactg gatccagaac 660
tccatttgga tatcaaagta ttgcagagtg ccttagcagc catccgacat gcccgctggt 720
tcgaggaaaa tgcttctcag tccacagtta aagttctcat cagactactg aaggacttga 780
ggattcgttt tcctggcttt gagcccctca caccctggat ccttgaccta ctaggccatt 840
atgctgtgat gaacaacccc accagacagc ctttggccct aaacgttgca tacaggcgct 900
gcttgcagat tctggctgca ggactgttcc tgccaggttc agtgggtatc actgacccct 960
gtgagagtgg caactttaga gtacacacag tcatgaccct agaacagcag gacatggtct 1020
gctatacagc tcagactctc gtccgaatcc tctcacatgg tggctttagg aagatccttg 1080
gccaggaggg tgatgccagc tatcttgctt ctgaaatatc tacctgggat ggagtgatag 1140
taacaccttc agaaaaggct tatgagaagc caccagagaa gaaggaagga gaggaagaag 1200
aggagaatac agaagaacca cctcaaggag aggaagaaga aagcatggaa actcaggagt 1260
gacattccct tcactccttt tcctacccaa gggggaagac tggagcctaa gctgcctgct 1320
actgggcttt acatggtgac agacatttcc gtgggatagg gaagatagca ggaagaaaag 1380
taaactccat agaagtgtca ttccactggg ttttgatatt ggcttagctg ccagtctccc 1440
atttgtgacc tatgccatcc atctataatg gaggatacca acatttcttc ctaatattct 1500
ataatctcca actcctgaaa acccctctct caactaatac tttgctgttg aaatgttgtg 1560
aaatgttaag tgtctggaaa tttttttttc taagaaaaac tattaaagta cttcctagta 1620
ggaaaaaaaa aaaaaaaaaa aaacycgggg gttttct 1657

<210> 93
<211> 485
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (478)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (485)
<223> n equals a,t,g, or c

<400> 93
aattcggcac gaggggttct gcactaacag cctccaagcc ccctggcact tcttttgccc 60
tgagagtgtc ccaggggatt cagagtctcc agaaagatat ggctrggcca actctgttgc 120
ctacctrgcc tgacccagtc ggagcctgac atggtggagg gaaagggaga caagtggggc 180
tgcactcggt ccagaggcca gctaggaggg aaaccgcagc ttcctggggc ttgtgtgtga 240
agattcctga cttaggggtg gcttttgttt acaagatgca agaggggaaa cctgtccccg 300
actcatcgag acaacatgcc cagttatcag ggagtcctgt gtcacaaggt ctgtctctgc 360
cattgtaagc aagtgccttg ggcgagctgg cctctgcccc acagtctcat ctgtacaccg 420
acagggttga tgcctccctc acagggttga gaacaagagc cakttggcca attaaaanaa 480
aaaan 485

<210> 94
<211> 764
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (202)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (565)
<223> n equals a,t,g, or c

<400> 94
ccccagccag tctgccctct gccatggggg gcggagagga cgaggaggag gccaccgact 60
atggagggac ctcagtgccg actgccgggg aggccgtgcg ggggctagaa acagctctgc 120
grtggctgga gaaccaggac cccagagagg tggggccact gaggctggtg cagttgcgct 180
cactcatcag catggcccgg angctggggg gcatcgggca taccccagca ggcccctatg 240
acggtgtgtg accaggccas cccagtgacc tttctcctgc tgcacttgga gggaggggac 300
atacacacag tctcccatct ctcctcccct ccccctgggg tggcccaccg catgggtaca 360
gggggttcca ggaatccaaa tccagcatgg cttggaggag ctctgttggt gagaggtcgc 420
cctgcctcac tggcaccctg ggggcacagc tggaagagag gcctggccca tgctcctctc 480
agggcaggca catgtacggg gcatacaagg cacagcgcct gttggaacag gtggctgtgt 540
tcctgctctg gcccccgtgc ggctngcctc cgcccctgca ccagtcacat gcactggacg 600
agggccgaaa ctcctgtctg ctatcgagcc ctggtgctat gtggccccgg agccacagca 660
caatcatctc agtggcgaag cacaccactt gattctattt ttttttaaca cattaaatct 720
gtttttaaag ataaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaa 764

<210> 95
<211> 707
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (45)
<223> n equals a,t,g, or c

<400> 95
atttaggtga cactatagaa ggtacgcctg caggtaccgt tccgnaattc ccgggtcgac 60
ccacgcgtgc catcatggcg caggatcaag gtgaaaagga gaaccccatg cgggaacttc 120
gcatccgcaa actctgtctc aacatctgtg ttggggagag tggagacaga ctgacgcgag 180
cagccaaggt gttggagcag ctcacagggc agacccctgt gttttccaaa gctagataca 240
ctgtcagatc ctttggcatc cggagaaatg aaaagattgc tgtccactgc acagttcgag 300
gggccaaggc agaagaaatc ttggagaagg gtctaaaggt gcgggagtat gagttaagaa 360
aaaacaactt ctcagatact ggaaactttg gttttgggat ccaggaacac atcgatctgg 420
gtatcaaata tgacccaagc attggtatct acggcctgga cttctatgtg gtgctgggta 480
ggccaggttt cagcatcgca gacaagaagc gcaggacagg ctgcattggg gccaaacaca 540
gaatcagcaa agaggaggcc atgcgctggt tccagcagaa gtatgatggg atcatccttc 600
ctggcaaata aattcccgtt tctatccaaa agagcaataa aaagttttca gtgaaaaaaa 660
aaaaaaaaaa aaaaaaaggg ggcccccttt tgggggtccc ctggggg 707

<210> 96

<211> 815
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (16)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (45)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (50)
<223> n equals a,t,g, or c

<400> 96
aacccctac tccctnccgt aatttttgta agcccttaaa ataanaaatn aaaaatycca 60
taacccccaa agaagaatcc cccccacatt wagccttgtt aagtaaatgc ctcctgaccc 120
caagcccgaa gatgcccccc attctctwag tgatggcggc gttagggttt gagagaaggg 180
aatttggctc aacttcagtt gagagggtgc agtccagaca gcttgactgc ttttaaatga 240
ccaaagatga cctgtggtaa gcaacctggg catcttagga agcagtccct ggagaaggca 300
tgttcccaga aaggtctctg gagggacaaa ctcactcagt aaaacataat gtatcatcat 360
gaagaaaact gattctctat gacatgaaat gaaaatttta atgcattgtt ataattacta 420
atgtacgctg ctgcaggaca ttaataaagt tgcttttta ggctacagtg tctcgatgcc 480
ataatcagaa cacacttttt ttcctctttc tcccagcttc aaatgcaaat tcatcattgg 540
gctcacttct aataactgca gtgtttcccg ccttgggctt gcagcagaaa aacctgacaa 600
catagtgttt gctaaggcag taatttagac tttaccttat ttgtgattac tgtagtgatt 660
gattgattga ttactattaa ctacaaggta taatttacta tcaccttatt taaattttat 720
gaattaattt gaatgttttt tacactaact aacttttccc aataaagtcc actatgaaac 780
cacgacaaaa aaaaaaaaaa aaaaaaaaaa aaaaa 815

<210> 97
<211> 658
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (627)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (634)
<223> n equals a,t,g, or c

<220>

<221> misc feature
<222> (635)
<223> n equals a,t,g, or c

<400> 97
catcattggc gcggggctgt cagcggccgg acgcggtcct ctacgcccgc cactacaaca 60
tcccggtgat ccatgccttc cgccgggccg tggacgaccc tggcctggtg ttcaaccagc 120
tgcccaagat gctgtacccc gagtaccaca aggtgcacca gatgatgcgg gagcagtcca 180
tcctgtcgcc cagcccctat gagggttacc gcagcctccc caggcaccag ctgctgtgct 240
tcaaggaaga ctgccaggcc gtgttccagg acctcgaggg tgtcgagaag gtgtttgggg 300
tctccctggt gctggtcctc atcggctccc accccgacct ctccttcctg cctggggcag 360
gggctgactt tgcagtggat cctgaccagc cgctgagcgc caagaggaac cccattgacg 420
tggacccctt cacctaccag agcacccgcc agragggcct gtacgccatg gggccgytgg 480
ccggggacaa cttcgtgagg tttgtgcagg ggggcgcctt ggctgtkgcc agctccctgc 540
taaggaagga acagaaccac ctacatcgcc aaccctggtc cagcctraga ggaatacatc 600
ctctgatcga cctcaaatcc ggagttnccc cttnncttgt caaattgacc gcccaata 658

<210> 98
<211> 249
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (248)
<223> n equals a,t,g, or c

<400> 98
aaaatggtag acctgacagt accggtccgg caattcccgg gattttgagc tggggttttg 60
agactsccct tagagataga gaaacagacc caagaaatgt gctcaattgc aatgggccac 120
atacctagat ctccagatgt catttcccct ctcttatttt aagttatgtt aagattacta 180
aaacaataaa agctcctaaa aaatcaaaaa aaaaaaaaaa aaaaaaaaaa aaccccgggg 240
ggggcccng 249

<210> 99
<211> 752
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (612)
<223> n equals a,t,g, or c

<400> 99
acggcttcaa ccgcagcttc tgcggccgca acgccacggt ctacgggaag ggcgtgtatt 60
tcgccaggcg cgcctccctg tcggtgcagg accgctactc gccccccaac gccgatggcc 120
ataaggcggt gttcgtggca cgggtgctga ctggcgacta cgggcagggc cgccgcggtc 180
tgcgggcgcc ccctctgcgg ggtcctggcc acgtgctcct gcgctacgac agcgccgtgg 240
actgcatctg ccagcccagc atcttcgtca tcttccacga cacccaggcg ctgcccaccc 300
acctcatcac ctgcgargca cgtgccccgc gcttcccccg acgacccctc tggrctcccg 360

ggccgctccc cagacactta accgaagggg ccaccctctg gcctcctgct tcccaggctc 420
ccagctccgc acaggctgat gctccccgcc cccaactgtg gccgcctgag ctgtccccgg 480
ggasgccctg cctccctctg cgggctccag aaggcggtgt gggggatggc ggtcagcagc 540
ggccgagggg ggccgggcta ggtcccagcc tgggccgacc ccaccaccag gggtcagcag 600
agcccaggag gngacaccgy ccgcccgccg ctcccagacc tcgcccgagt cggctctgtt 660
gtttgaataa acgtgaacgt gaacccaggc ggaagggacc cgggaaaaaa aaaaaaaaaa 720
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aa 752

<210> 100
<211> 3059
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (14)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (28)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (109)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (3019)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (3047)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (3058)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (3059)
<223> n equals a,t,g, or c

<400> 100
ggggtaaaac cccngaaaaa aactccanat tttaattaaa tggcctcctc ccttcccccc 60
ttctttcccc ccgtcccccа actccctttc ctcgtcctct ttcccccccnc ccctctccct 120

tttctcccca tctttcacct tcctaatttc agtgaaattg gagcgatttg aaattccaat 180
caaggttcga ttaagcccag agccatggac ccctgaaact ggtttggtaa ctgatgcttt 240
caaactgaaa aggaaggagc tgaggaacca ttacctcaaa gacattgaac gaatgtatgg 300
gggcaaataa aatgttgttg tcttattgac agttgtgcag gaggtagcct ggtggttttc 360
aacctctaga attttaagcc tttgttgaac tgttagaatg taaggtatat cattctaaag 420
atagagtaaa aagaaaacaa aaccaaaagt tattaaaatt gttgtccggt ttactttaac 480
ttagttttgc atagttctag tgcagctgaa attgaaaagt tatttccctt tagctgtgtt 540
attatagagc agaaattctg tttttaaaaa ttagcctaag atatacttgt ttttgtaaag 600
aaaaatattt aatgttgaac aaaataaatt ggagttggag tagaatgtag tttgaggaaa 660
tttgcagctt ccaatgcctc ttgtcttcct atttcagaag tttaaatatt aagcatgaca 720
gaaaatatgt attaacacta ctcaaagcaa aagtgctgca gggctttaaa attctcttcc 780
aaccatttat cttgaaggaa aaattcaata gtaatataat acmcaaaatc aaataatacc 840
ttagaaggta ttaagattat aattgttgca taggttagat atagagtcat tgtaatgttg 900
tgaataatta cagtgcctaa aataagaata gaacaacata tacaacacca aaaaatatct 960
agtaatatat ttaaagggaa attgagctgc tttttttgaa actttgagat ctaaaaataa 1020
ctgtaattat ttgaatgact aagaggaaag tacatttttt gaaatgctga aaattgcctt 1080
tctgtgttta ttcaaactga aaagctgaga ccaagagcaa ggaaggtaaa aagttaacag 1140
gcaaacattt tctcttagaa aaggtgataa aatcataagt atttggaatt agaacccttk 1200
cacagcactg aacctgggaa agagatttaa actctgaatt tatctttgat aacagggatt 1260
gattttaaaa tgtacatgta ttaaattaca tttgtaattt aaggtctgtt tgctgttgct 1320
gattttattc ttgatcagta gtttgcattt cagaaagcct ttcattttgc tttaatttta 1380
gcaaagcggg ttataatgaa tgacttcccc aatatcttgc ttgaacttac aggtgattaa 1440
cttggatgag ttttgggaag ttaaagggaa gaaaacactg ttatcatttt ttcctgtttg 1500
ggaagagctt agaaactgga aatactagat ttgggagaag ggcagagtta cttgataagg 1560
gactgatgtt tgtgcagtaa cttgggagtg tggtttcttt ttgaatcttt aattaaaacc 1620
tgggattata tatccctgat aaatattcac acttgaacca tagttactgt aaaatgcaaa 1680
aaatcttaat actgttattc tttgcacttt ttcttaatca ttttttatat atatgcatat 1740
atatatgtgt gtgtgtgtgt tgcttatgtt gttttgtaca gatgtgggcc accattgcaa 1800
caaaatacat tctttttgct ctaaaatatt tatgaagaaa atacttaaat gttatgtata 1860
tggtggtaat aagggaaaaa tcaagtatta taaacaagaa tgaaggtttt tgtaaagatt 1920
tctgttcagc gttttgcaag gtaaaatttt aggcaagttt tccctgaagt tatgtgtatg 1980
tgagtattct cattcttccc aacttgcctt tgaagagtga aataccatta ttatcaagta 2040
gactactgtt cagcttttat tcctgccctg ctgtttatcc cttaagaatg agtttcttag 2100
acttttccaa tatgtgattt tttttcccat ttagaatggt gattttaaat gtgtgagtgc 2160
atgtactatc ttatctcaga tatttgcacc cccaatctgc ccccaactcc caaaagctag 2220
aacactgcca actgatctgt tataggtcct ttagaaacac ataattaaca cttaaggttg 2280
ggtgctgcta attctttgca aaaatccaaa tattgttaag ggaccaggga gatgccacta 2340
ccccttgatt ttccatctaa aaatatacat gtttatgtaa acaaatcttt ccatatccat 2400
agtgactttt caagtattta agcctaaaga ttttgatctc acatttttat acctgtttaa 2460
attgctcaca gttattacat acacatcagc catcaactaa agttgtactt taaaaattta 2520
ctacaatatg tacatttcta agtcaaacac ttgtgacttt tgctttaatt ccatgaatgt 2580
tcctgcctcc ttgatatttg tatttattct ttttttctct agagtagagg tataattgtg 2640
tgatatttca gaaatacaga taaatgattc aaaaagtcac agttaaggag aatcatgttt 2700
ctttgatcat gaataactga ttagtaagtc ttgcctatat tttcctgata gcatatgaca 2760
aatgtttcta aggtaacaag atgagaacag ataaagattg tgtggtgttt tggatttgga 2820
gagaaatatt ttaattttta aatgcagtta caaattataa tgtattcata tttgtacttt 2880
ctgttaaaat gcatgattgc agaattgttt agattttgtg tttattcttg atgaaaagct 2940
ttgtttgttc ttgtttttaa gtttgcactc aaatcttaag aaataaatcc acccatgtta 3000
tcaaaaaaaa aaaaaaaanc ccgggggggg gcccggaacc aaatccnccc aagggggnn 3059

<210> 101

<211> 1682
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (52)
<223> n equals a,t,g, or c

<400> 101
ggcacgagga tggawgcctg atggggtgca gacacagatg gcaccccagg rntgtgccat 60
tccaccagac gtctcctaag acagagttag agtcaacaat ctttggcagt ccgaggctgg 120
ctagtgggct cttcccagag tggcagagct gggggagaat ggagaacttg gcctcttatc 180
gatgaattaa gcaacaatgt aactggtctt gacttgtcat attcccccat gcaatcctag 240
gtctgtattg ctcaatttta ggaagccttt gctactccat cagtaggttt agatttgagc 300
ttttgagacc tggctatgga aaagaaagac acttgagaat ttagtgttgg ggtctgtaca 360
gatgatgcta cccaatttgg ctttgaagga tcaagtaaca ggttgaaaac tatttttata 420
aaggtaatac tttttcagtt cccttcttcc ttccctctca atccactagc tttcatgttg 480
ggcaaggaaa agttgaggaa ggatggctga tggtgatgga aagctgtgtt aatggtatga 540
ggaatgtgtg aaaagtatac acaaagggct ctgaagctca agtcagagga gtgggaggtc 600
tgatcattgt tggtggaaaa acgtaaggtt attttgtgtt tttaagttgg ttttacaatt 660
ctttcctggg gaaattattt ctggagggga aaaagatcca ttctacgtat ccttgtggag 720
aaaagctaaa taacctttaa gaatgtgggt ggtattggag aaagaagatg aattatagct 780
ccggagaatc aagatcttaa gtgaagcctt tctgttcaga tgtgatctat aaaaaatcat 840
aatttgggga aagtttaagc aaatctggct ttgtagtcct gatgttataa gtgactttgt 900
gatcaaactg tcaggcttgg gttcttgtta tagaatgctt ggtatagaaa aaccatgcca 960
tcattaatgg ctaacaacac gtagggactt catgtcatgt caaagatagc tctttgcaag 1020
tgccttgatt aaaccagaaa actgtcatcg tttaacccaa atatctgaat ggtcatctgg 1080
taactcatgg gtttttggcc tcataagatg gtccactctg tacacaggca ttcctcctgc 1140
aataatgttg tatctttgag accgttgtca gtgtacacaa ctcacatcct tcatattgaa 1200
ggtgactcat ttttctgcac actttttga tgtgatgctt gacgtgaggc ccgacactag 1260
gattctcaat gcaagaatcc agtaccttgc acatagaagt agcaacccat cccttgccta 1320
ttttcatctt gctgttttct tttttttaaa aaaatggatg tgacttgttt tgaatgtttt 1380
gtattatact tgtttttgtg tgtgcataaa ttcattctgt aggatcttaa gaaaaagagt 1440
cccagaatgt tgcttctatt attgtgcaca accattgaga ggtgttacaa gaatgcagtt 1500
aattttaaca tgtgtgatgt gccatggtgg aaaagtacta tcggaataac tctgcagtga 1560
cagaatttga agtttggcta gcatccatac ttttctactg taaatatttc actctcctct 1620
agctatcctt gatgagcttc tcactttaag aataaatgtg tttgatataa aaaaaaaaaa 1680
aa 1682

<210> 102
<211> 938
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (30)
<223> n equals a,t,g, or c

<220>

<221> misc feature
<222> (812)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (913)
<223> n equals a,t,g, or c

<400> 102
cccacgcgtc cgtccgggtg ctcgcgcgcn gacctggacg cagagaagcc agagactttc 60
gcttccggct gccgcaggct tcgctggtgc aggtaagctc cgcacactct cggccggtcc 120
cgagtccgac tccctcaagg gtgacgcgag ctctgccctt taaccggaaa cgtctccctg 180
ctcaccccac ccccgcgcag acgcagtgct gagcacacag ctaccggaca aagagtgacg 240
cccggagctg gagttatggc ggctacggag ccgatcttgg cggccactgg gagtcccgcg 300
gcggtgccac cggagaaact ggaaggagcc ggttcgagct cagcccctga gcgtaactgt 360
gtgggctcct cgctgccaga ggcctcaccg cctgcccctg agccttccag tcccaacgcc 420
gcggtccctg aagccatccc tacgccccga gctgcggcct ccgcggccct ggagctgcct 480
ctcgggcccg cacccgtgag cgtagscctc aggccgaagc tgaagcgcgc tccacaccag 540
gccccgccgg ctctagactc ggtcccgaga cgttccgcca gcgtttccgg cagttccgct 600
accaggatgc ggcgggtccc cgggaggctt tccggcagct kcgggagctg tcccgccagt 660
ggctgcggcc tgacatccgc accaaggagc agatcgtgga gatgctggtg caagagcagc 720
tgctcgccat cctkcccgag gcggctcggg cccggcggat ccgccgccgc acggatgtgc 780
gcatcactgg ctgagcggtg gagctgcggg cngccagggc cgggcgctct gtgcggactg 840
gggccatgat cgggcccggg ggcctgagcc tgggacccca ccccgtgtta atgaaaaatg 900
agttttggca gcnaaaaaaa aaaaaaaaaa aagggcgg 938

<210> 103
<211> 2012
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1993)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2002)
<223> n equals a,t,g, or c

<400> 103
gctggataat tccagcctgt tagctactca caggaacatg cagaattatt ggctccaggg 60
agttttggag aaagaaggtt tacgttttca aacttacaga taacagttga catcaatgct 120
tctctttccc agaacaatct ggagtttgcc agaaaactct gtaaacagga gtcgtgctgt 180
gtgtgaactg taaactcttc tctccaggcg tcgaggggac ctttgcttta ctttgcagct 240
gggctacatc agacgtgtgc attggaaaca taaacttcct taactgggaa aagaatgctt 300
ctctgtcttc maaatarttc tgctatgtga cattttgcc atcatgaatt ttacatcagt 360
gmtagctctt tgttttacgt gtttcattkg gcaggtcaca aaggctcttg gctaccacac 420
atacgtgcat acacacacac acacacacac acacacacac acacactcat aaaggatttt 480

cttttctgct ttacctttaa ttttcagtct acttggcttg taatgaaagg tagagcctta 540
tttttgaact atatcccaac agaatcgaat ttccattttg ccaagaatta taaaaccctg 600
aggttttaaa attcagtttc ttttctgggg atttaacatg gaaggacttg gagggcaaat 660
ggsccagtga ttggaaargg gaaaaacaaw tcatttcatt taaaattatt caataaccat 720
tgccagcatt tgggattctg agtgctgttt atgaagccct ttcattgata taatttcatc 780
tatctctcac aaggctgtaa gcaattccta tgtccatatg gcagtgagga aatggagatt 840
tgagcaggtt aagggagttt tcacctggaa gctcttcttt tttttccttc tgccacagta 900
rggtcatcag actgtcagcc ccagcactgg gagccgagta acacgcatgt tctcattaat 960
atccttttct catgttttta ttaaagatat atgcaagttg ccgaaagacg aaggaacttg 1020
cagggatttc atattaaaat ggtactatga tccaaacacc aaaagctgtg caagattctg 1080
gtatggaggt tgtggtggaa acgaaaacaa atttggatca cagaaagaat gtgaaaaggt 1140
ttgcgctcct gtgctcgcca aacccggagt catcagtgtg atgggaacct aagcgtgggt 1200
ggccaacatc atatacctct tgaagaagaa ggagtcagcc atcgccaact tgtctctgta 1260
gaagctccgg gtgtagattc ccttgcactg tatcatttca tgctttgatt tacactcgaa 1320
ctcgggaggg aacatcctgc tgcatgacct atcagtatgg tgctaatgtg tctgtggacc 1380
ctcgctctct gtctccaggc agttctctcg aatactttga atgttgtgta acagttagcc 1440
actgctggtg tttatgtgaa cattcctatc aatccaaatt ccctctggag tttcatgtta 1500
tgcctgttgc aggcaaatgt aaagtctaga aaataatgca aatgtcacgg ctactctata 1560
tacttttgct tggttcattt tttttccctt ttagttaagc atgactttag atgggaagcc 1620
tgtgtatcgt ggagaaacaa gagaccaact ttttcattcc ctgcccccaa tttcccagac 1680
tagatttcaa gctaattttc tttttctgaa gcctctaaca aatgatctag ttcagaagga 1740
agcaaaatcc cttaatctat gtgcaccgtt gggaccaatg ccttaattaa agaatttaaa 1800
aaagttgtaa tagagaatat ttttggcatt cctctaatgt tgtgtgtttt tttttttgt 1860
gtgctggagg gaggggattt aattttaatt ttaaaatgtt taggaaattt atacaaagaa 1920
acttttaat aaagtatatt gaaagttaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1980
aaaaaaaaaa aanaaaaaaa anaaaaaaaa aa 2012

<210> 104
<211> 1094
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (26)
<223> n equals a,t,g, or c

<400> 104
tcctcctggg aagcctggcc tgcctncccc gcaaaaggtg tttttgcgct ggttcaatga 60
atagatgatg cagaggcccc attggagaca cgtgaatggc gtgtgcggcc atcagttccc 120
ggctgggggg caggtgttgc ttcggccccc gccctccggc cggcgtgtgc gagtgcgccc 180
ctggctgtga gtgttgaccg ttcctctccc ctgtacatag cmcgagccag tcctgagtgg 240
gtgactcctg agtgggtgac gcgcagacgg gatttctcag gtcatttgta tggtcgacat 300
gatggctgct gctttggctg ccaccacccc cgggcccagc ctgtctgaaa ttcagggttt 360
aggccgaaaa acccggtggg gaggggtggg gagccggagm tctgtggcgg ggctggaggg 420
ctggggtgca ctttagtttg gggcgggacg ggagccgccg ttgtgactgg cgtggtctgg 480
ctgctgctcc cgaacggagg ggtcggggtt ggcttgctgg gccctcagag cccagtgggt 540
ggctctgact cggctcccta ctccctgcac ccagctgggc gcacttgggg cctgcggtct 600
gaatgtatcc ctccctcag ttttaacctg agctgccgaa cgcacagtgg gccgggggcg 660
aggctggggg aagcggggcc caattacgga tcccgggagt tacaggtgcc gacgtgatgt 720
cgcttctctg gtgcccagct cccttcctgg tctgagacta gctctggggg tggcgggggc 780

ccccamacgc tgctcccgct ccaccctgcc cgtgctgctg ctctgtgcct gctgtcagag 840
ccctggtggg ggaggatgtg gccaccctga gacccggagg agacgggcgt ctgcctgggt 900
ttgcggagag ccgcttatgg gtgtggtccg tccagacacc ttgtttcaag ggggatgggc 960
gtgagcgggc aagcagagca tccccaccgc tgagcaagaa ctttttcttg tttttaaacc 1020
atcacgtcct catttcacat tggaataaag tgagtttttg aaacctgcga aaaaaaaaaa 1080
aaaaaaaaaa attc 1094

<210> 105
<211> 2297
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (30)
<223> n equals a,t,g, or c

<400> 105
agctcgtgcg cccgccgtgc cggtccggan attcccgggt cgacccacgc gtccgatctg 60
tcctgcacca tctgcctaat tccttcctca cagtctgtag ccatctgata tcctagggga 120
aaaggaaggc caggggttca catagggccc cagcgagttt cccaggagtt agagggatgc 180
gaggctaaca agttccaaaa acatctgccc cgatgctcta gtgtttggar gtgggcagga 240
tggagaacag tgcctgtttg ggggaaaaca ggaaatcttg ttaggcttga gtgaggtgtt 300
tgcttccttc ttgcccagcg ctgggttctc tccacccagt aggttttctg ttgtggtccc 360
gtgggagagg ccagactgga ttattcctcc tttgctgatc ctgggtcaca cttcaccagc 420
cagggctttt gacggagaca gcaaataggc ctctgcaaat caatcaaagg ctgcaaccct 480
atggcctctt ggagacagat gatgactggc aaggactaga gagcaggagt gcctggccag 540
gtcggtcctg actctcctga ctctccatcg ctctgtccaa ggagaacccg gagaggctct 600
gggctgattc agaggttact gctttatatt cgtccaaact gtgttagtct aggcttagga 660
cagcttcaga atctgacacc ttgccttgct cttgccacca ggacacctat gtcaacaggc 720
caaacagcca tgcatctata aaggtcatca tcttctgcca cctttactgg gttctaaatg 780
ctctctgata attcagagag cattgggtct gggaagaggt aagaggaaca ctagaagctc 840
agcatgactt aaacaggttg tagcaaagac agtttatcat caactctttc agtggtaaac 900
tgtggtttcc ccaagctgca caggaggcca gaaaccacaa gtatgatgac taggaagcct 960
actgtcatga sagtggggag acaggcagca aagcttatga aggaggtaca gaatattctt 1020
tgcgttgtaa gacagaatac gggtttaatc tagtctaggc accagatttt tttcccgctt 1080
gataaggaaa gctagcagaa agtttattta aaccacttct tgagctttat ctttttgac 1140
aatatactgg agaaactttg aagaacaagt tcaaactgat acatatacac atatttttt 1200
gataatgtaa atacagtgac catgttaacc taccctgcac tgctttaagt gaacatactt 1260
tgaaaaagca ttatgttagc tgagtgatgg ccaagttttt tctctggaca gkaatgtaaa 1320
tgtcttactg gaaatgacaa gtttttgctt gatttttttt tttaaacaaa aaatgaaata 1380
taacaagaca aacttatgat aaagtatttg tcttgtagat cagggttttg ktttgktttt 1440
ttaattttaa aatgcaaccc tgccccctcc ccagcaaagt cacagctcca tttcagtaaa 1500
ggttggagtc aatatgctct ggttggcagg caaccctgta gtcatggaga aaggtatttc 1560
aagatctagt ccaatctttt tctagagaaa aagataatct gaagctcaca aagatgaagt 1620
gacttcctca aaatcacatg gttcaggaca gaaacaagat taaaacctgg atccacagac 1680
tgtgcgcctc agaaggaata atcggtaaat taagaattgc tactcgaagg tgccagaatg 1740
acacaaagga cagaattcct ttcccagttg ttaccctagc aaggctaggg agggcatgaa 1800
cacaaacata agaactggtc ttctacactt tctctgaatc atttaggttt aagatgtaag 1860
tgaacaattc tttctttctg ccaagaaaca aagttttgga tgagctttta tatatggaac 1920
ttactccaac aggactgagg gaccaaggaa acatgatggg ggaggcagag agggcaagag 1980

taaaactgta gcatagcttt tgtcacggtc actagctgat ccctcaggtc tgctgcaaac 2040
acagcatgga ggacacagat gactctttgg tgttggtctt tttgtctgca gtgaatgttc 2100
aacagtttgc ccaggaactg ggggatcata tatgtcttag tggacagggg tctgaagtac 2160
actggaattt actgagaaac ttgtttgtaa aaactatagt taataattat tgcattttct 2220
tacaaaaata tattttggaa aattgtatac tgtcaattaa agtgtttttg tgtaaaaaaa 2280
aaaaaaaaaa actcgta 2297

<210> 106
<211> 442
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (419)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (423)
<223> n equals a,t,g, or c

<400> 106
tcgacccacg cgtccgcctg tgggacgcgg tggtggccgt tgggtcggga gagtgagcgg 60
tatttgcmtc gtttttcttg cttgttttcc ccccgttaga ctttgtcggt agagcgcggt 120
tatgggccgc aagaagaaga agcagctgaa gccgtggtgc tggtattgta atagagattt 180
tgatgatgag aagattctta tacaacacca aaaagcaaaa cattttaaat gtcatatatg 240
tcataagaag ttgtacacag gacctggctt agctattcat tgcatgcagg tgcataaaga 300
gacaatagat gctgtaccaa atgcatacct gggagaacag acatkgattg gaaatatatg 360
gtatggaarg tattccagaa aaagatatkg atgaaagaag acgacttctt ggaacagana 420
acnccagaga gtccaaaaaa ag 442

<210> 107
<211> 1019
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (995)
<223> n equals a,t,g, or c

<400> 107
ttgatctgcg gctgtcgagg cctgaggcag tggaggctga ggctatgatg gcggccatgg 60
cgacggctcg agtgcggatg gggccgcggt gcgcccaggc gctctggcgc atgccgtggc 120
tgccggtgtt tttgtcgttg gcggcggcgg cggcggcggc agcggcggag cagcaggtcc 180
cgctggtgct gtggtcgagt gaccgggact tgtgggctcc tgcggccgac actcatgaag 240
gccacatcac cagcgacttg cagctctcta cctacttaga tcccgccctg gagctgggtc 300
ccaggaatgt gctgctgttc ctgcaggaca agctgagcat tgaggatttc acagcatatg 360
gcggtgtgtt tggaaacaag caggacagcg ccttttctaa cctagagaat gccctggacc 420
tggccccctc ctcactggtg cttcctgccg tcgactggta tgcagtcagc actctgacca 480

cttacctgca ggagaagctc ggggccagcc ccttgcatgt ggacctggcc accctgcggg 540
agctgaagct caatgccagc ctccctgctc tgctgctcat tcgcctgccc tacacagcca 600
gctctggtct gatggcaccc agggaagtcc tcacaggcaa cgatgaggtc atcgggcagg 660
tcctgagcac actcaagtcc gaagatgtcc catacacagc ggccctcaca gcggtccgcc 720
cttccagggt ggcccgtgat gtagccgtgg tggccggagg gctaggtcgc cagctgctac 780
aaaaacagcc agtatcacct gtgatccatc ctcctgtgag ttacaatgac accgctcccc 840
ggatcctgtt ctgggcccaa aacttctctg tggcgtacaa ggaccagtgg gaggacctga 900
ctcccctcac ctttggggtg caggaactca acctgactgg ctccttctgg aatgactcct 960
ttgccagcty tcactgacct atgaacgact ctttngtacc acagtgacat taaagttat 1019

<210> 108
<211> 711
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (642)
<223> n equals a,t,g, or c

<400> 108
cttgaaaact tagtttacta tacatcttgc cctattaata tgttctctta acgtgtgcca 60
ttgttctctt tgaccatttt cctataatga tgttgatgtt caacacctgg actgaatgtc 120
tgttctcaga tcccttggat gttacagatg aggcagtctg actgtccttt ctacttgaaa 180
gattagaata tgtatccaaa tggcattcac gtgtcactta gcaaggtttg ctgatgcttc 240
aaagagctta gtttgyggtt tcctggacgt ggaaacaagt atctgagttc cctggagatc 300
aacgggatga ggtgttacag ctgcctccct cttcatgcaa tctggtgagc agtggtgcag 360
gcggggagcc agagaaactt gccagttata taacttctct ttggcttttc ttcatctgta 420
aaacaaggat aatactgaac tgtaagggtt agtggagagt ttttaattaa aagaatgtgt 480
gaaaagtaca tgacacagta gttgcttgat aatagttact agtagtagta ttcttactaa 540
gacccaatac aaatggatta tttaaaccaa gtttatgagt tggtttttt cattttcyat 600
ttgtatttta ttaagagtgc ttttcttatg gtgatttttt tnaattgcga tttgatatgg 660
tttggccata tggccccacc caaatcccca tcttggatta taatccccat g 711

<210> 109
<211> 743
<212> DNA
<213> Homo sapiens

<400> 109
tcgagttttt ttttttttt ttttactttt taaaatttta ttgatgtacc acctgatcaa 60
agcatgggat attttaatag tattatacat aatattttta catagaaaac tttacatagc 120
atttcatatt atataattct gcttattctt tcaaaaattt atacatccat tgggcaagga 180
atggttttca ttaaattacc aatattaaat gcacttaatc attgtgtata ggttaaacca 240
aagtaactat taactaactt ttaggcattt taaggaggta aaacatacat tttacacata 300
aatatttgat gcaaatatgc agataaaatt ttttaaaaat tagaacactg agtaaaacac 360
ctttgataga ttatattgtt ttgttttgag agcaaggatt tccagatatg ttcattcttt 420
aaaacactca gctttggttt ctttgtttcc caaactgcaa agctgctgat aacaaaactc 480
caggattcca tgtgagttca gctatgtcta ctttaacaca aatattaaaa cagaattcag 540
raaatgcagt attaaggatc cagcttctat tgaaaccaat atccatttgc atcataacaa 600
caaacatttg aatgagatgg tcacacttgt acttatcagc aggttccttt aataacaaag 660

actactaaat gtatatcctt aatcacaaaa gaacaacaaa aaaaatacag gttttttttt 720
tttcatttcg tacaaaagtc acc 743

<210> 110
<211> 795
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (2)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (645)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (737)
<223> n equals a,t,g, or c

<400> 110
tnctaaatat cagatgtctt tgatgtaagg gtagggaatg gagaaatatt ttcaattgtg 60
tatttgtatt acaaagaact tgaaatttac tttcttagtt gattatatta aatgatgtat 120
atattatatg tggtttataa gctcaacact ggccattttt ttagttttat tgttaaatgg 180
tatttttcta tgtttaatta taatagatct ggctttttct ggatagcata aagatcactg 240
aactatatat atataagara caagagttct attttagcac aaaggcattt tatattattt 300
attgaatcca taagtttgtt ttcgtcaaaa acattccata ttatttctgc tccttttttat 360
ttgtatagtt tgttatttaa agaaatggca gtccttcctg ttcttaatac aataaaattg 420
aaataatgca cctagtaatg tggccgacat ctcttctcac caccatggac tgttttcaac 480
aacagttgat cttctggtct gtgctgagag gcgcatgcat gtctttcgtc acgtcgggca 540
gcacacctgc tgtgaaatac tgctttcatc tacctcttca gaaggcttct tgcttgttga 600
caagtaccgc aaaggcttta ttctggactg gctatctcat aaaanggatt tctgtaagac 660
tttgcagtgt cattccctca gaaccyaggt ttgtttctaa agccacggta ttgtccrrgr 720
rcccctgtgt ktggggncag gtagctatcc ctcccatgtc attagtaatc ctttaggatt 780
ttaaggtaca atggg 795

<210> 111
<211> 1332
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1)
<223> n equals a,t,g, or c

<220>
<221> misc feature

<222> (6)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1194)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1237)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1241)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1300)
<223> n equals a,t,g, or c

<400> 111
ncgggncagc agctcccagt gtgacctgac aaaaacacgt aggggcaggg acggtcccca 60
cccccaggga cacaacccct ggtcttggac cagtagagga cacggagggt tcagacccct 120
cctcagaccc tccccacatc tgaaactgcc tccccccaac caccagcagc agcagggccc 180
tcctcccccа ccagctctcc ccacagggcc cctcagcatc atggagaccc gcagcggggc 240
ttagccaccc ctcaaaccca gggccccctg gcacctgggc tctggccgtg ttttctggcc 300
agagccccac tttcctaact cgtgctccct tccgccttct tttccgtact gtgaagaaag 360
aactctccac cccagctccc accctgccct ggcctgggtg gaggaactgt gcctccatcc 420
ccagaagaaa cagccccctc tgctgctggg gtgggactgt ctgtgtgccc tgtgggggtc 480
cgtgtgagca ggcccacctg gctccagacc cgcccccaac ctgagacaga accaggctga 540
gccaggcctc caccccccacc cccgtttgct gggggctcct ccagccgccc ccatggraag 600
aggcctggta ccgsctcacc cacagaggtc tgtgccaggt gcgcttctgc aggtggagcc 660
aagctctccc tgaggccaga ggcggggcct gggccgggag cccaggggaa ggccaggctg 720
gaccccggct ycacacccac atccagcctg caggcctctc tgcagtcctc tcaccctccc 780
tmagctcccc ttcctctgca gtcaccctca gctccccttc cttgcccgcc tctccccccg 840
ccgccccacc agttaaacgg atgaccaaag acctttctta tgccggaagc aaaaaccaaa 900
acttttgtt ggctttttcc tttgtsgcct ccccagcacc tgccctccca gtctcccacc 960
ccggccccag gctggaagcc tccctccact taagttattg ttttaaacca aagtttacag 1020
tgtctgttgg tggccaagac cttctctctc caccctcct ccatccaccc tgaggaccct 1080
ggggctcagt ggaggcaggg ccctgccccc cttccctttc cggctcctgg cccagcctgg 1140
ggggaaggga raaagggagg gggaraaagc ggggttcttc acccctcag ggantggggc 1200
acggggagcc ctttcttccc tggaccctgg ggcttgnttc ntgggggggc tcttccaaga 1260
acccctcttc taagggaacc aagtttcacc cgttcgtggn tgggggatgt tgggatttct 1320
aaggcaaaag ag 1332

<210> 112
<211> 743
<212> DNA

<213> Homo sapiens

<220>
<221> misc feature
<222> (53)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (272)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (275)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (278)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (590)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (618)
<223> n equals a,t,g, or c

<400> 112
ttgctggtct gatccatgca catggccagg ctgctaggct cttgtgctgg gcnggaagtc 60
ggtgcggatg gccagctcca ggatgacccg ccgggacccg ctcacaaata aggtggccct 120
ggtaacggcc tccaccgacg ggatcggctt cgcatcgccc ggcgtttggc ccaggacagg 180
gccacgtggt cgtcagcagc cggaagcagc agaatgtgga ccaggcggtg gcacgctgca 240
rggggagggg ctgagcgtga cgggcacctg tncantgntg gggaaggcgg aggaccggga 300
gcggctggtg gccacggctg tgaagcttca tggaggtatc gatatcctag tctccaatgc 360
tgctgtcaac cctttctttg gaagcataat ggatgtcact gaggaggtgt gggacaagct 420
ctggatggac aaggaaaaag aggaaagcat gaaagaaacc ctgcggataa gaaggttagg 480
cgagccagag gattgtgctg gcatcgtgtc tttcctgtgc tctgaagatg ccagctacat 540
cactggggaa acagtggtgg tgggtggagg aaccccgtcc cgcctctgan ggaccgggag 600
acagcccaca ggccagantt gggctctagc tcctggtgst gttcctgcat tcamccaytg 660
gsctttccc acctytgytc amcttactgt tcacctcatc aaatcagttc tgccctgtga 720
aaagatccag ccttccctgc cgt 743

<210> 113
<211> 1690
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1659)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1664)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1676)
<223> n equals a,t,g, or c

<400> 113
aattcggcac cactcagtcc cacaggcctc ggccagggac acaccggcca cgtccgcttc 60
ttggctgcag tccagctgcc agatggcttc aacctgctct gcccaacccc accacctccc 120
ccagacacag gccccgagaa gctgccatca ctggagcacc gggactcccc ttggcaccga 180
ggccccgccc ctgccaggcc taaaatgctg gttatcagtg gaggtgatgg ctatgaggac 240
ttccgactca gcagtggggg cggcasagca gtgagactgt gggtcgagac gacagcacaa 300
accacctyct cctgtggagg gtgtgaccct gtctgccgtg gcccaggact sgcccgccca 360
cctgccttca gcctgcttgc ctctccctag cccacacgca gactttgacc aggagtatcc 420
agccagggga cacatgtgcy kgcrtgggct ctgcttgtct tcgcggaaga ttcctgatgg 480
aacacccact ggccagccag gccatggctt ctcccgaccc tctggctgcc ccggtgcttc 540
cagtcatgat cgggtggggg acatgtgggc tgaccaggac ctctgaccct ggagcttcta 600
ccaaagacac agctgggtct ggaccccacg ggsstgggga gggccatgtg caatatttgg 660
agggttttct ggagggcagc aggaaggctg gggaattccc catgtacagt atttatgttt 720
ctttttagat gtgtaccttc ccaagcactt atttatgcag tgacctggtc acctggggtg 780
ggggtgattt gaggaaatga catgaggaaa agaaacctat tcctgccctg gggaccaccc 840
tgggactcta accaagcctt cctggaggga cccatgcgcc cctgagcccc attccattca 900
tacagacaca cacgtacgca cactgcatgt ccaaggccct aaacattgcc cgttgacata 960
aactttccag ggccccagcc tgatggggct gccctcagtc ctctagatca agatgctgac 1020
tattaggggg cagtgattgc catctgggga cctgtcaggc tttgtcattt cccagtttgt 1080
tggtggtgcc tttagtggtt ccctaatttg ggaacactga tggggccttg gacagggctt 1140
tctctcaggt aggagaaatg ggcccatgat ctcctcacag tcgcccccag tccttggccc 1200
tgcttccctg tgtctcatgc actggcacat atggtcacct tggagggcag acctaggagc 1260
ccctctgacc actgaatccg tctccacacc ccttctgcca agggaagccc cttcaggaag 1320
gacccccaa agctgagggg ctgaatgtag ccttttcaac agagaaggct cccacttgag 1380
agcagcctct acctgacccc ctggaccaca gagagccact ctgaccctca gccccctcgc 1440
ttcttcagct aaaactccaa aggtttggtt tcagatgggg tttgttttgt tctgtttggt 1500
tttggttttg tttggggtgg gtgggtcatt gcggtcttag attatgtttc tcttgctacc 1560
aaacagtcat gtattaactc tctttggatg atgaagttta aagagtcaat aaatagaaac 1620
accagatgac tgcaaaaaaa aaaaaaaaaa aaaaaaaana aaanaaaaaa aaaaanaaaa 1680
aaaaaaaaaa 1690

<210> 114
<211> 620
<212> DNA
<213> Homo sapiens

<400> 114
ctctgggcct gggtctgggg gagagggttg ccagggagac tcagctctcc ttgggggctg 60
gccagctgac tgagggtaca caggattggg tctagacctt gatgcctggg tggagggccc 120
ttgtaagggg ccatagcctc ttcaggacca actggaggga gagttaggaa acaccagctc 180
ctgcctgggg cagtgaggga atgggagcag ctgtgggcgc ctcatttcag gcaagtcctc 240
cccaaacctt cagatgcagt gagacctggc cttcctgttg tgcttttcag actttgtttt 300
cagaatgctt ttatctcgag tgtgcccttc ggccctcaca agagcccctg gggagtaggt 360
ggtggcctgt gccgtcatcc ccatttcaaa gcagggagct gaggtcctgg gaggggaaag 420
tgcttgcctg aggtcccact gtgttagtgg gtgggcagga ctggaactcg gttctccaac 480
agcccagagc tcactctttt acacccagag gtggagcagg tggcttaggg ggtggttatg 540
tacttcacaa gccaattccc ttcagccagg agctcctggg tgcatttccg tgtcagaaac 600
agtaccgagt cccacccccc 620

<210> 115
<211> 542
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (392)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (412)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (511)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (521)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (535)
<223> n equals a,t,g, or c

<400> 115
tcgacccacg cgtccgcttc tcggcccctt gtagaacctc tgtcaggttc agcctactcg 60
cctctactcc agcctccact ccggcctcca ccatgtccgt caggtgaccc agaagtccta 120
caaggtgtcc acctccggcc cccgggcctt cagcagccgc tcctacacca gcgggcctgg 180
ctcccgcatc agctcgtccg ccttctcccg ggtgggcggc asttccgggg gggcctgaac 240
agcagcatga gtgtggtcgg gggctacggc ggcggggccg gggtatgggg ggcatcacgg 300
ccgtctcagt gaaccagagc ctgctgagcc cccttwaagc tggaatkgga tcccaacatc 360

caagctgtgc gcaacccagg agaaggagca gntcaagacc ttcaacaaca anttggcttc 420
gttcatcgac aagtgaagca ctggagcagc agaacaaatt tttggagacc aattggagct 480
tcttaaagca gcagaagacg cgcggagaac ntagacaaat nttcgagagt aaatnagaac 540
tt 542

<210> 116
<211> 525
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (420)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (424)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (517)
<223> n equals a,t,g, or c

<400> 116
aattcaaccg tcgttatccc aaaattcagt tttcactttc caccggccct tccggcacta 60
tgctggatgg tgtactggag ggaaaactga atgcggcgtt tattgatgga cccattaacc 120
atactgccat cgacgggata ccggtatacc gcgaggaact gatgatcgtc acgccacaag 180
gatatgcgcc agtaacccgt gccagtcagg ttaatggcag taacatttat gccttccgcg 240
ccaattgttc gtatcgtcgc cacttcgaga gctggtttca tgctgacggt gccgctccgg 300
gaactatcca tgagatggag tcttatcacg gaatgttggc ctgtgtgatc gcaggagcag 360
gcattgcgct tattccgcgc tctatgctgg aaagtatgcc ggggcatcac cargttgaan 420
cgknggccgt tagctgagca atggcgttgg ttaacaacct ggctggtctg gccgtcgtgg 480
tgcgaaaaaa cgttccgctc gaaggggggc ccggtancca attcg 525

<210> 117
<211> 728
<212> DNA
<213> Homo sapiens

<400> 117
aacgagcgcc tgctaggatc agcggtggtg gttccgcgat ggtaggcggc ggcggggtcg 60
gcggcggcct cctggagaat gccaaccccc tcatctacca gcgctctggg gagcggcctg 120
tgacggcagg cgaggaggac gagcaggttc ccgacagcat cgacgcacgc gagatcttcg 180
atctgattcg ctccatcaat gacccggagc atccactgac gctagaggag ttgaacgtag 240
tagagcaggt gcgggttcag gttagcgacc ccgagagtac agtggctgtg gctttcacac 300
caaccattcc gcactgcagc atggccaccc ttattggtct gtccatcaag gtcaagcttc 360
tgcgctccct tcctcagcgt ttcaagatgg acgtgcacat tactccgggg acccatgcct 420
cagagcatgc agtgaacaag caacttgcag ataaggagcg ggtggcagct gccctggaga 480
acacccacct cttggaggtt gtgaatcagt gcctgtcagc ccgctcctga gcctggcctt 540

tgacccctca gcctgcatac tggtatcctg gtcccagctc ctgccagggc tgttaccgtt 600
gttttcttga atcactcaca atgagaaact aacattttgc tttttgtaat aaagttaatt 660
tatattcarw tcaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa acccgggggg 720
gggccccc 728

<210> 118
<211> 948
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (920)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (944)
<223> n equals a,t,g, or c

<400> 118
agaagtacgg acccctgaag cccctgccac agaccccgca cctggaggas gacttgaagg 60
aggtgctgcg ttctgaggct ggcatcgaac tcatcatcga ggacgacatc aggcccgaga 120
agcagaagag gaagcctggg ctgcggcgga gcccatcaag aaagtccgga agtctctggc 180
tcttgacatt gtggatgagg atgtgaagct gatgatgtcc acactgccca agtctctatc 240
cttgccgaca actgcccctt caaactcttc cagcctcacc ctgtcaggta tcaaagaaga 300
caacagcttg ctcaaccagg gcttcttgca ggccaagccc gagaaggcag cagtggccca 360
gaagccccga agccacttca cgacacctgc ccctatgtcc agtgcctgga agacggtggc 420
ctgcgggggg accagggacc agcttttcat gcaggagaaa gcccggcagc tcctgggccg 480
cctgaagccc agccacacat ctcggaccct catcttgtcc tgaggtgttg agggtgtcac 540
gagcccattc tcatgtttac aggggttgtg ggggcagagg gggtctgtga atctgagagt 600
cattcaggtg acctcctgca gggagccttc tgccaccagc ccctccccag actctcaggt 660
ggagcaacag ggccatgtgc tgccctgttg ccgagcccag ctgtgggcgg ctcctggtgc 720
taacaacaaa gttccacttc caggtctgcc tggttccctc cccaaggcca cagggagctc 780
cgtcagcttc tcccaagccc acgtcaggcc tggcctcatc tcagaccctg cttaggatgg 840
gggatgtggc caggggtgct cctgtgctca ccctctcttg gtgcattttt ttggaagaat 900
aaaattgcct ctctctttgn aaaaaaaaaa aaaaaaaaaa gggnggcc 948

<210> 119
<211> 211
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (123)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (125)

<223> n equals a,t,g, or c

<400> 119
tcgacccacg cggtccgctt ggtggggtcg gctgctttct cgcgtttccc cccaaccccg 60
tccggcctcg cccagcgttt ccacgcggaa ccaactgcca gaggcgcggc gcggcgtcga 120
gcngngcgag tgtgaggaaa ccgccgcctc agccgagcgc gcgggcccgc ccagggcgtt 180
agttttcggc gcgcagtcgc ggtcccccgg c 211

<210> 120
<211> 1308
<212> DNA
<213> Homo sapiens

<400> 120
tcgacccacg cgtccggact gttctaagtg agttcgggtg ggggagcttc acgaggggag 60
gctgctctgt gaaggaaccg cctttctctc cgcgtgtctc acccttttct ccccatatct 120
gtttggacat gagctgaggg cacggtcgcg ggcggtcagc ctgttcgcag ctacggcgag 180
gaggggcgcg attgytcctt gttgccgctc cgcttagtgg ccgcgtccat tccgcgcggt 240
gtcccgattt taggggtagg gagaagtgtc agcttcaggc atcgcgaggc gtggcggccc 300
catggccccg ctgggaggcg ccccgcggct ggtactgctg ttcagcggca agaggaaatc 360
cgggaaggac ttcgtgaccg aggcgctgca gagcagactt ggagctgatg tctgtgctgt 420
cctccggctc tctggtccac tcaaggaaca gtatgctcag gagcatggct tgaacttcca 480
gagactcctg gacaccagca cctacaagga ggcctttcgg aaggacatga tccgctgggg 540
agaggagaaa cgccaggctg acccaggctt cttttgcagg aagattgtgg agggcatctc 600
ccagcccatc tggctggtga gtgacacacg gagagtgtct gacatccagt ggtttcggga 660
ggcctatggg gccgtgacgc agacggtccg cgttgtagcg ttggagcaga gccgacagca 720
gcggggctgg gtgttcacgc caggggtgga cgatgctgag tcagaatgtg gcctggacaa 780
cttcggggac tttgactggg tcatcgagaa ccatggagtt gaacagcgcc tggaggagca 840
gttggagaac ctgatagaat ttatccgctc cagactttag tcactaggtt ctaggagtga 900
gctggggcct gctgaggtgg gggtggggct gactctgcaa aatgggggtg tcccccgatc 960
ctggccgagg tgaggaacag acaggggggg tctagattct gaggggttg gtggatattg 1020
ggcaaggcag gaaacctctg gagacctcat tttctccatg gggaagacag ccatgctctt 1080
caggaggaga ctccaagggc aaaggagggt gtcttggctg tgcttgaagg cgaaaccctg 1140
ccatatcccc agtgccagtc ccctcagcct gtggtggcct tgcatcctga ctggatgttc 1200
tcagcccctt gttctgggca agaacccaga gctccccagt gtggatacta ataaacctct 1260
tggagcacaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaagg 1308

<210> 121
<211> 2516
<212> DNA
<213> Homo sapiens

<400> 121
gattgacatt ccagtgaaat gatgggagtt aattgattta atttagatta gttgaaaatt 60
attacaaaat attctaaaag ggtttttttgt ggtacttcaa gaaacctgat tagttttgat 120
ctattgaaat cacaaaagta gaacagggcw ytttattttt gtataattta ggattaggta 180
tgcttctttg ttctaacaag tcatgttttc taacccttct ttcactaagc aaaccagaac 240
agatttgaac tgttatgggt tatatattag tatggagatc agctcagatg acattaaaaa 300
tgccgtagtg ttattcttgt atgccaaatc ttttttttccc caaaattagc actttaattt 360
tatttactgt tataatattt gttttcttag attaggtagg aaatcttaat ttggccaccg 420
cctactttga caagtaaata ttacatcata cgattttgca acattaaatt agaacactag 480

aaactaaaaa attatgtttc agtgaatgct acaactaagc attttttttt tttaagaaaa 540
acaattgtat tatgttttgt tgccttgcca ctttgagtat cttatctgaa aatctgttcc 600
ttgccatgtt tttctcctgt taacataaac tatgtgccct gtgaatttct ggggactgaa 660
tttgaaattg ctcctgccaa ccgtttgtgg cctggcgtgt atctgaatgc ctgaatatct 720
ccccgctgaa tgaatttcgt attctgccct gaattcactc gggtatattg attggctgga 780
tgatcttggt gccgcccact tgacgtttcc agaagagtca ccgaagaaaa gaaccaggag 840
tgtagaggat gatgaggagg gtcacctgat ctgtcagagt ggagacgtac taagtgcaag 900
atgtatagaa tatttttcaa cacttattaa cttttcagat aacataatct atatatagat 960
taagctttca gggatttgga aatctttttt tctttctctt ttttgttttt gttttatttt 1020
tccatttctt ttggtggggg ggattgtatt tttgctttct ttagaaatgt aatgtttgtt 1080
atatagaact tccagaacag taatcaaatt aatgaaatta gacctaataa ttatgttttt 1140
tgatggtgtt gaccaataaa atatctagtg ataaggaaat ttgtagcatc aactagaata 1200
atctacattg atagcattta ttgtgataag tacattgttt ccacttcttg atatgactga 1260
gatttatttc tctcttttag atgaaattgt tgatacttta ggtgaaggag cttttggaaa 1320
agttgtggag tgcatcgatc ataaagcggg aggtagacat gtagcagtaa aaatagttaa 1380
aaatgtggat agatactgtg aagctgctcg ctcagaaata caagttctgg aacatctgaa 1440
tacaacagac cccaacagta ctttccgctg tgtccagatg ttggaatggt ttgagcatca 1500
tggtcacatt tgcattgttt ttgaactatt gggacttagt acttacgact tcattaaaga 1560
aaatggtttt ctaccatttc gactggatca tatcagaaag atggcatatc agatatgcaa 1620
gtctgtgaat tttttgcaca gtaataagtt gactcacaca gacttaaagc ctgaaaacat 1680
cttatttgtg cagtctgact acacagaggc gtataatccc aaaataaaac gtgatgaacg 1740
caccttaata aatccagata ttaaagttgt agactttggt agtgcaacat atgatgacga 1800
acatcacagt acattggtat ctacaagaca ttatagagca cctgaagtta ttttagccct 1860
agggtggtcc caaccatgtg atgtctggag cataggatgc attcttattg aatactatct 1920
tgggtttacc gtatttccaa cacacgatag taaggagcat ttagcaatga tggaaaggat 1980
tcttggacct ctaccaaaac atatgataca gaaaaccagg aaacgtaaat attttcacca 2040
cgatcgatta gactgggatg aacacagttc tgccggcaga tatgtttcaa gacgctgtaa 2100
acctctgaag gaatttatgc tttctcaaga tgttgaacat gagcgtctct ttgacctcat 2160
tcagaaaatg ttggagtatg atccagccaa aagaattact ctcagagaag ccttaaagca 2220
tcctttcttt gaccttctga agaaaagtat atagatctgt aattggacag ctctctcgaa 2280
gagatcttac agactgtatc agtctaattt ttaaatttta agttattttg tacagctttg 2340
taaattctta acatttttat attgccatgt ttattttgtt tgggtaattt ggttcattaa 2400
gtacatagct aaggtaatga acatcttttt cagtaattgt aaagtgattt attcagaata 2460
aatttttgt gcttatgaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaggg aggggg 2516

<210> 122
<211> 1139
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1053)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1124)
<223> n equals a,t,g, or c

<220>

<221> misc feature
<222> (1125)
<223> n equals a,t,g, or c

<400> 122
gtggcgcacg gggtgggagc ggacccaggc cgggagcagg cgccgccgcc agtgagaacc 60
ggggccggag ccgggtgcgg atttgctggg gctgagtcgg gggcgcgcgg gccctgacct 120
ctgccctctg acctctcccc tagcaggcga ccatggggaa cgtgttggct gccagctcgc 180
cgcccgcagg gccgccaccg ccgcctgcgc cggccctcgt ggggctgccg ccacctccgc 240
cctcgccgcc gggcttcacg ctgccgccgc tgggaggcag cctgggcgcc ggcaccagta 300
cgaktcgarg ttcggaacgg acccccgggg ctgcaaccgc cagcgcctca ggggccgccg 360
aggatggggc ctgcggctgc ctgcccaacc cgggcacatt cgaggagtgc caccggaagt 420
gcaaggagct gtttcccatt cagatggagg gtgtcaagct cacagtcaac aaagggttga 480
gtaaccattt tcaggtcaac cacacagtag ccctcagcac aatcggggag tccaactacc 540
acttcggggt cacatatgtg gggacaaagc agctgagtcc cacagaggcg ttccctgtac 600
tggtgggtga catggacaac agtggcagtc tcaacgctca ggtcattcac cagctgggcc 660
ccggtctcag gtccaagatg gccatccaga cccagcagtc gaagtttgtg aactggcagg 720
tggacgggga gtatcggggc tctgacttca cagcagccgt caccctgggg aacccagacg 780
tcctcgtggg ttcaggaatc ctcgtagccc actacctcca gagcatcacg ccttgcctgg 840
ccctgggtgg agagctggtc taccaccggc ggcctggaga ggagggcact gtcatgtctc 900
tagctgggaa atacacattg aacaactggt tggcaacggt aacgttgggc caggcgggca 960
tgcacgcaac atactaccac aaagccagtg accagctgca ggtgggtgtg gagtttgagg 1020
ccagcacaag gwtgcaggac accagcgtct ccnttsgggt accagcttgg aacttgccca 1080
agggccaacc tcytctttca aaggstctgt tgggataagc aaannngggat tcgtggggt 1139

<210> 123
<211> 2114
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1966)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2039)
<223> n equals a,t,g, or c

<400> 123
accccgcgcg ccactcgctc gcgtcmgagg gaggagaaag tggcgagttc cggatccctg 60
cctagcgcgg cccaaccttt actccagaga tcatggctgc cgaggatgtg gtggcgactg 120
gcgccgaccc aagcgatctg gagagcggcg ggctgctgca tgagattttc acgtcgccgc 180
tcaacctgct gctgcttggc ctctgcatct tcctgctcta caagatcgtg cgcggggacc 240
agccggcggc cagcggcgac agcgacgacg acgagccgcc ccctctgccc cgcctcaagc 300
ggcgcgactt caccccgcc gagctgcggc gcttcgacgg cgtccaggac ccgcgcatac 360
tcatggccat caacggcaag gtgttcgatg tgaccaaagg ccgcaaattc tacgggcccg 420
aggggccgta tggggtcttt gctggaagag atgcatccag gggccttgcc acattttgcc 480
tggataagga agcactgaag gatgagtacg atgacctttc tgacctcact gctgcccagc 540
aggagactct gagtgactgg gagtctcagt tcactttcaa gtatcatcac gtgggcaaac 600

tgctgaagga gggggaggag cccactgtgt actcagatga ggaagaacca aaagatgaga 660
gtgcccggaa aaatgattaa agcattcagt ggaagtatat ctatttttgt attttgcaaa 720
atcatttgta acagtccact ctgtctttaa aacatagtga ttacaatatt tagaaagttt 780
tgagcacttg ctataagttt tttaattaac atcactagtg acactaataa aattaacttc 840
ttagaatgca tgatgtgttt gtgtgtcaca aatccagaaa gtgaactgca gtgctgtaat 900
acacatgtta atactgtttt tcttctatct gtagttagta caggatgaat ttaaatgtgt 960
ttttcctgag agacaaggaa gacttgggta tttcccaaaa caggtaaaaa tcttaaatgt 1020
gcaccaagag caaaggatca acttttagtc atgatgttct gtaaagacaa caaatccctt 1080
ttttttctc aattgactta actgcatgat ttctgtttta tctacctcta aagcaaatct 1140
gcagtgttcc aaagactttg gtatggatta agcgctgtcc agtaacaaaa tgaaatctca 1200
aaacagagct cagctgcaaa aaagcatatt ttctgtgttt ctggactgca ctgttgtcct 1260
tgccctcaca tagacactca gacaccctca caaacacagt agtctatagt taggattaaa 1320
ataggatctg aacattcaaa agaaagcttt ggaaaaaaag agctggctgg cctaaaaacc 1380
taaatatatg atgaagattg taggactgtc ttcccaagcc ccatgttcat ggtggggcaa 1440
tggttatttg gttattttac tcaattggtt actctcattt gaaatgaggg agggacatac 1500
agaataggaa caggtgtttg ctctcctaag agccttcatg cacacccctg aaccacgagg 1560
aaacagtaca gtcgctagtc aagtggtttt taaagtaaag tatattcata aggtaacagt 1620
tattctgttg ttataaaact atacccactg caaaagtagt agtcaagtgt ctaggtcttt 1680
gatattgctc ttttggttaa cactaagctt aagtagacta tacagttgta tgaatttgta 1740
aaagtatatg aacacctagt gagatttcaa acttgtaatt gtggttaaat agtcattgta 1800
ttttcttgtg aactgtgttt tatgatttta cctcaaatca gaaaacaaaa tgatgtgctt 1860
tggtcagtta ataaaaatgg ttttacccac taaaaaaaaa aaaaaaaggg cggccgctct 1920
aaaggatccc tcgaggggcc caagcttacg cgtgcatgcg acgtcntagc tctctcccta 1980
tagtgagtcg tattataagc taggcactgg ccgtcgtttt acaacgtcgt gactgggana 2040
tctgctagct tgggatcttt gtgaaggaac cttacttctg tggtgtgaca taattggaca 2100
aactacctac agag 2114

<210> 124
<211> 583
<212> DNA
<213> Homo sapiens

<400> 124
gcccggccta ttcccttggg cttttaaaaa gcgtcttgga tggaggtggt gcaggtgctc 60
accaagcccg cagtaaccca agttgcatgt atccccaggg cacttttgtg attcccctgc 120
ttgtgactgc acaccgggac cccactcaat tcaaagaccc agactgcttc aaccctacca 180
acttcctgga caagggcaag ttccagggca atgatgcttt catgcccttt gcctcaggtg 240
caggcagagg aggaagggga ccagcctgga ctggctctgg ggtacctggt gctcactgtg 300
cacctgtgta cccggcaaag cagatgtgcc tgggcacagg cctggcccac tcgggtatct 360
tcctattcct tacggccacc ttacagaggt tctgcctgct ccctgtggta cgccctggca 420
ccatcaacct cacctgcagt gcactggcct gggcagtgtc cccccagact tccagctcca 480
gccagtggcc tgctgaggtc aggctccact atggtgggct cactggccct caaacctcca 540
taccctccts ggtcaataaa ggccctaaat tgcaaaaaaa aaa 583

<210> 125
<211> 1987
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature

<222> (7)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (14)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (517)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1960)
<223> n equals a,t,g, or c

<400> 125
cagtacngtc cgantcccgg gtcgacccac gcgtccgatg gcggcggagg aacctcagca 60
gcagaagcag gagccgctgg gcagcgactc cgaagtgtta actgtctggc ctatgatgaa 120
gccatcatgg ctcagcagga ccgaattcag caagagattg ctgtgcagaa ccctctggtg 180
tcagagcggc tggagctctc ggtcctatac aaggagtatg ctgaagatga caacatctat 240
caacagaaga tcaaggacct ccacaaaaag tactcgtaca tccgcaagac caggcctgac 300
ggcaactgtt tctatcgggc tttcggattc tcccacttgg aggcactgct ggatgacagc 360
aaggagttgc agcggtgaga agggtgggca ctgggcaccg aggcaggtgg gtgtytacct 420
cctccccggg cgagtaggat gtgtctcgag tagggtgtct ycctccttcc cgggcgatgg 480
gctggactct ggccttgcca rgcggggcag tgctgtntcg gccctggcgt ctgggctggt 540
cgaggagccc atgctgggcc cgcctttcca tcccaccccc aggttcaagg ctgtgtctgc 600
caagagcaag gaagacctgg tgtcccaggg cttcactgaa ttcacaattg aggatttcca 660
caacacgttc atggacctga ttgagcaggt ggagaagcag acctctgtcg ccgacctgct 720
ggcctccttc aatgaccaga gcacctccga ctaccttgtg gtctacctgc ggctgctcac 780
ctcgggctac ctgcagcgcg agagcaagtt cttcgagcac ttcatcgagg gtggacggac 840
tgtcaaggag ttctgccagc aggaggtgga gcccatgtgc aaggagagcg accacatcca 900
catcattgcg ctggcccagg ccctcagcgt gtccatccag gtggagtaca tggaccgcgg 960
cgagggcggc accaccaatc cgcacatctt ccctgagggc tccgagccca aggtctacct 1020
tctctaccgg cctggacact acgatatcct ctacaaatag ggctggctcc agcccgctgc 1080
tgccctgctg ccccctctg ccaggcgcta gacatgtaca gaggtttttc tgtggttgta 1140
aatggtccta tttcaccccc ttcttcctgt cacatgaccc ccccccatgt tttattaaag 1200
ggggtgctgg tggtgagccg tgtgtgcgtg tccctgctct gctgcccgcc tggctgctct 1260
gtctgctgcc ccctcccccc aggtgggtcc ccctgctttt cacctatcta ctcctgagct 1320
tccccaacag gagcaggttt gaggggccag gcctcttgga ggcccctcct gcttcgttgg 1380
gttctgcttc cttcccttct tagctggctc aggggcttct atgggatcct ggaagttcct 1440
tagggacttg cccagggtcc cagggccacc cacacttcat ctgctccctc ataggcccca 1500
cctccacgtc ccggctgggc cccagacccc agcttcctgc cctccaccgg gagtctgcat 1560
ggttgggagt cctgggtgga ggggcctttg tgaggctgga cccggctcag ggcaggtgga 1620
ggagctgggc ctcccacagg gtgcccgggc agtgccatcc tggtgggga gggcagcctt 1680
caaacgtgtg gggtctamag tcctcaggtc taggcagggc tgccggttct ccacctcccc 1740
atccgcccca ggccccctgc ctgtgcctgc cttgcacccc ctctgcttgg gccacggtgt 1800
ctctgcattg cctgcctttt tgccttcacc tcttttcttc cccgcccct gcacattcgg 1860
gktctcagcc cccaggctgt gagctccttg gggcaggccc tcaataaatg tgaaactgct 1920

gctgcaaaaa aaaaaaaaaa aaaaaaaggg ggccgcttan agatcctcaa gggccaagta 1980
cggtgat 1987

<210> 126
<211> 1451
<212> DNA
<213> Homo sapiens

<400> 126
ggtcgaccca cgcgtccgag atggcggagc gcgggtacag cttttcgctg actacattca 60
gcccgtctgg taaacttgtc cagattgaat atgctttggc tgctgtagct ggaggagccc 120
cgtccgtggg aattaaagct gcaaatggtg tggtattagc aactgagaaa aaacagaaat 180
ccattctgta tgatgagcga agtgtacaca aagtagaacc aattaccaag catataggtt 240
tggtgtacag tggcatgggc cccgattaca gagtgcttgt gcacagagct cgaaaactag 300
ctcaacaata ctatcttgtg taccaagaac ccattcctac agctcagctg gtacagagag 360
tagcttctgt gatgcaagaa tatactcagt caggtggtgt tcgtccattt ggagtttctt 420
tacttatttg tggttggaat gagggacgac catatttatt tcagtcagat ccatctggag 480
cttactttgc ctggaaagct acagcaatgg gaaagaacta tgtgaatggg aagactttcc 540
ttgagaaaag atataatgaa gatctggaac ttgaagatgc cattcataca gccatcttaa 600
ccctaaagga aagctttgaa gggcaaatga cagaggataa catagaagtt ggaatctgca 660
atgaagctgg atttaggagg cttactccaa ctgaagttaa ggattacttg gctgccatag 720
cataacaatg aagtgactga aaaatccaga atttcagata atctatctac ttaaacatgt 780
ttaaagtatg ttttgttttg cagacttttt gcatacttat ttctacatgg tttaaatcga 840
ctgtttttaa aatgacactt ataaatccta ataaactgtt aaacccacct tccagccttt 900
taggagttgc taaaatttta acagttattt ccygcttttt atcacagttg atttctgaag 960
actayattgc caagcagaat gatgaaatga ctttttcgtt gtcaggcaat tttggttaag 1020
tcaaatctta atgccctctt cgctatcaga tgttgcctgt gtttccataa agcaaaatgc 1080
tgattttggt aaaaaacatg actgcttcta gagctgggag gatctgcaga ctttcacgga 1140
ttcatggaac aagaaaagaa gcataggtac ttttaggtgc cattaggtat tgatcagtga 1200
aatcctaggg tgctctatga gattgtacta ggcctatgaa gagtggtaag ccaaataggt 1260
ctccatggga gatacattat gtaaataaat aaacaatggt ttgctggttc ctgttggtgt 1320
ctccacaagt aggtaaacat gtttaaagga acccgggttc ttagattttg ttagactttt 1380
taaactcaag gatgagcata agtgcttgaa ataaaatgct aatacttaag tgtcaaaaaa 1440
aaaaaaaaaa a 1451

<210> 127
<211> 1234
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (857)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1204)
<223> n equals a,t,g, or c

<220>

<221> misc feature
<222> (1226)
<223> n equals a,t,g, or c

<400> 127
aggttcccag ctagccagta aattctttaa agacaagcat tgtacccttt gcctcagtgt 60
gcccagcacc aacctggcac atgctctatt catgttttcc atgagtgttt catgttagag 120
gtgtattttg tacacaggtt ttatgctggg ggctcagaga gaagtggaca gcagattgtt 180
ggccctccca ggaagaaaag tcccaacgag ctggtgggat gatctcttta aaggtgccaa 240
agagcatgga gctgtagctg tggagcgagt gaccaagagc cctggagaga ccagtaaacc 300
gagaccattt gcaggaggtg gctaccgcct tggggcagca ccagaggaag agtctgccta 360
tgtggcagga gaaaagaggc agcattccag ccaagatgtt catgtagtat tgaaactctg 420
gaagagtgga ttcagcctgg ataatggaga actcagaagc taccaagacc catccaatgc 480
ccagtttctg gagtctatcc gcagagggga ggtgccagca gagcttcgga ggctagctca 540
cggtggacag gtgaacttgg atatggagga ccatcgggac gaggactttg tgaagcccaa 600
aggagccttc aaagccttca ctggcgaggg tcagaaactg ggcagcactg cccccaggtg 660
ttgagtacca gctctccagc ccaacaggca gaaaatgaag ccaaagccag ctcttccatc 720
ttaatcgacg aatcagagcc taccacaaac atccaaattc ggcttgcaga cggcgggagg 780
ctggtgcaga aatttaacca cagccacagg atcagcgaca tccgactctt catcgtggat 840
gcccggccag ccatggntgc caccagcttt atcctcatga ctactttccc gaacaaagag 900
ctggctgatg agagccagac cctgaaggaa gccaacctgc tcaatgctgt catcgtgcag 960
cggttaacat aaccgcccag ccagctgcct ggcctccctc ctgtgtttcc catggccagt 1020
ggccatgccc catggggatc gcccctcctg ccccccttgtg cacacccagc agtccagtgc 1080
aacgtctcct ccatagctct gggttcttag atcttggttg gacgtttgtt ttctccttag 1140
ttgcatttcc tgggtttttg tgatgatcaa tggactttaa tgaaaaaaaa aataaaaaca 1200
accnaaaggg gggcccggtc ccaatncccc cctt 1234

<210> 128
<211> 863
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (840)
<223> n equals a,t,g, or c

<400> 128
cccacgcgtc cgcaggcgcg ctcgggctgc cgctggctct tcgcacgcgg ccatggccga 60
ctccgagctg cagctggttg agcagcggat ccgcagcttc cccgacttcc ccaccccagg 120
cgtggtattc agggacatct cgcccgtcct gaaggacccc gcctccttcc gcgccgccat 180
cggcctcctg gcgcgacacc tgaaggcgac ccacgggggc cgcatcgact acatcgcagg 240
cctagactcc cgaggcttcc tctttggccc ctccctggcc caggagcttg gactgggctg 300
cgtgctcatc cgaaagcggg ggaagctgcc aggccccact ctgtgggcct cctattccct 360
ggagtacggg aaggctgagc tggagattca gaaagacgcc ctggagccag gacagagggt 420
ggtcgtcgtg gatgatctgc tggccactgg tggaaccatg aacgctgcct gtgagctgct 480
gggccgcctg cargctgagg tcctggagtg cgtgagcctg gtggagctga cctcgcttaa 540
gggcagggag aagctggcac ctgtaccctt cttctctctc ctgcagtatg agtgaccaca 600
gggcctccca gcccaacatc tccagctgga tcccagggaa atatcagcct tgggcaactg 660
cagtgaccag gggcaccggc tgcccacagg gaacacattc ctttgctggg gttcagcgcc 720
tctcctgggg ctggaagtgc caaagcctgg ggcaaagctg tgtttcagcc acactgaacc 780

caattacaca cagcgggaga acgcagtaaa cagctttccc acaaaaaaaa aaaaaaaaan 840
aaaaaaaaaa aaaaagggcg gcc 863

<210> 129
<211> 1238
<212> DNA
<213> Homo sapiens

<400> 129
cacagtgtct gctgtgattg agatgcgcac aggttggggg aggtagggcc ttacgcttgt 60
cctcagtggg ggcagtttgc cttagatgac arctgggctc ttcttcacac cacctgcagc 120
ccctccctgc ccctgcccta gctgctgtgt gttcagttgc cttctttcta cctcagccgg 180
cgtggagtgg tctctgtgca gttagtgcca ccccacacac ccgtctcttg attgagatgt 240
ttctggtggt tatgggtttc ccgtggagct kggggtgggc gccgtgtacc taagctggag 300
gctggcgctc tccctcagca caggtgggtc agtggccagc aggcccatct ggagtgggag 360
tgggcacttc caccccgccc acaggccatc cggctgtgca ggccagcccc taggagcarg 420
tcccgggtga ctggcagttt tcacggtcta gggccgagac gatggcatgg ggcctagagc 480
atgaggtaga gcagaatgca gaccacgccg ctggatgccg agagaccctg ctctccgagg 540
gaggcatctg tgtcatgctg tgagggctga ggacggggcc ctagtctctg gttttctggt 600
cttaacatcc ttatctgtgt ccgccacgga ggtgactgag ctgctagcga gttgtcctgt 660
cccaggtact tgagttttgg aaaagctgac tcacgcccat ccatctcaca gcccttccct 720
ggggacagtc gcttccgcct tgacacctca ctctcagttg aataactcaa gcttggtcat 780
cttcagactc gaattcttga gtagacccag acggcttagc ccaagtctag ttgcagctgc 840
ctcggcaagt ccccatttgc tcaggcagcc ctgaatgggc ctgtttacag gaatggtaaa 900
ttgggattgg aaggaatata gcttccagct tcataggcta gggtgaccac ggcttaggaa 960
acagggaaag aaagcaaggc ccttttcctg cctttcccgg gatctgtcta ctccacctcc 1020
acgggggagg ccagtgggga agggctgtca cctcttcccc atctgcatga gttctggaac 1080
tctgtcctgt tggctgcttg cttccagctc cccccaatct ccatcgcagc gggttcctcc 1140
tgtcttttct acagtgtcat aaaacatcct gcccctaccc tctcccaaag gtcaatttta 1200
attctyawca agaagattta tgaggagaag aaaaagaa 1238

<210> 130
<211> 379
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (373)
<223> n equals a,t,g, or c

<400> 130
tggtttggga gctgccaggc tcctgggagg atcgcagtca gcagagcagg gctgaggcct 60
gggggtagga gcagagcctg cscatctgga ggcagcatgt ccaagaaagg gagtggaggt 120
gcagcraagg acccaggggc agagccacgc tggggatgga ccccttcgag gacacgctgc 180
ggyggctgcg tgaggccttc aactgakggc gcacgcggcc ggccgagttc cgggctgcgc 240
actccagggc ctgggccact tccttcaaga aaacaagcar cttctrcgmg acgtgctggc 300
ccaggaactg cataagccag ctttcgaagg cagacatatc tgagtcatcc tttgccagaa 360
cgaggttgaa tangctctt 379

<210> 131

<211> 1786
<212> DNA
<213> Homo sapiens

<400> 131
cctgggcgct aagatggcgg cggcgtgagt tgcatgttgt gtgaggatcc cggggccgcc 60
gcgtcgctcg ggccccgcca tggccgtcac catcacgctc aaaacgctgc agcagcagac 120
cttcaagatc cgcatggagc ctgacgagac ggtgaaggtg ctaaaggaga agatagaagc 180
tgagaagggt cgtgatgcct tccccgtggc tggacagaaa ctcatctatg ccggcaagat 240
cttgagtgac gatgtcccta tcagggacta tcgcatcgat gagaagaact ttgtggtcgt 300
catggtgacc aagaccaaag ccggccaggg tacctcagca cccccagagg cctcacccac 360
agctgcccca gagtcctcta catccttccc gcctgccccc acctcaggca tgtcccatcc 420
cccacctgcc gccagagagg acaagagccc atcagaggaa tccgccccca cgacgtcccc 480
agagtctgtg tcaggctctg ttccctcttc aggtagcagc gggcgagagg aagacgcggc 540
ctccacgcta gtgacgggct ctgagtatga gacgatgctg acggagatca tgtccatggg 600
ctatgagcga gagcgggtcg tggccgccct gagagccagc tacaacaacc cccaccgagc 660
cgtggagtat ctgctcacgg gaattcctgg gagccccgag ccggaacacg gttctgtcca 720
ggagagccag gtatcggagc agccggccac ggaagcagga gagaaccccc tggagttcct 780
gcgggaccag ccccagttcc agaacatgcg gcaggtgatt cagcagaacc ctgcgctgct 840
gcccgccctg ctccagcagc tgggccagga gaaccctcag cttttacagc aaatcagccg 900
gcaccaggag cagttcatcc agatgctgaa cgagcccccc ggggagctgg cggacatctc 960
agatgtggag ggggaggtgg gcgccatagg agaggaggcc ccgcagatga actacatcca 1020
ggtgacgccg caggagaaag aagctataga gaggttgaag gccctgggct tcccagagag 1080
cctggtcatc caggcctatt tcgcgtgtga aaaaaatgag aacttggctg ccaacttcct 1140
cctgagtcag aactttgatg acgagtgatg ccaggaagcc aggccaccga agcccccacc 1200
ctacccttat tccatgaaag ttttataaaa gaaaaaatat atatatattc atgtttattt 1260
aagaaatgga aaaaaaaatc aaaaatctta aaaaaacaag caaacagtcc agcttcctgt 1320
cctcctaaag tggcccctgt tcccatctcc cgggccagac agctgtcccc ccgtcctcct 1380
ccccagccca gcctgctcag agaagctggc aggactggga ggcgacagat gggcccctct 1440
tggcctctgt cccagctctc tgcagccaga cggaaaggcg gctgcttgcc tctccatcct 1500
ccgaaaaacc cctgaggacc ccccccatc ctcttctagg atgaggggaa gctggagccc 1560
caactttgat cctccattgg agtggcccaa atctttccat ctagggcaag tcctgaaagc 1620
ccaaggcccc ctccccagtc tggccttgcc tccagcctgg agaagggcta acatcagctc 1680
attgtcaagg ccacccccac cccagaacag aaccgtgtct ctgataaagg ttttgaagtg 1740
aataaagttt taaaaactaa aaaaaaaaaa aaaaaaaaaa aaaaaa 1786

<210> 132
<211> 974
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (165)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (853)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (963)
<223> n equals a,t,g, or c

<400> 132
ggcagctaac ctcctcatcc ccgctgtggg ttctagcctc tctgaagccc tggacttgat 60
cgagtcggac cctgatgctt ggtgtgacct gagtaaattt gacctccctg aggaaccatc 120
tgcagaggac agtatcaaca acagcctagt gcagctgcaa gcgtncacat cagcagcaag 180
tcctgccacc ccgccagcct tccgccctgg tgcccagtgt gaccgagtac cgcctggatg 240
gccacaccat ctcagacctg agccggagca gccggggcga gctgatcccc atctccccca 300
gcactgaagt cgggggctct ggcattggca caccgccctc tgtgctcaag cggcagagga 360
agaggcgtgt ggctctgtcc cctgtcactg agaatagcac cagtctgtcc ttcctggatt 420
cctgtaacag cctcacgccc aagagcacac ctgttaagac cctgcccttc tcgccctccc 480
agtttctgaa cttctggaac aaacaggaca cattggagct ggagagcccc tcgctgacat 540
ccaccccagt gtgcagccag aaggtggtgg tcaccacacc actgcaccgg gacaagacac 600
ccctgcacca gaaacatgct gcgtttgtaa ccccagatca gaagtactcc atggacaaca 660
ctccccacac gccaaccccg ttcaagaacg ccctggagaa gtacggaccc ctgaagcccc 720
tgccacagac cccgcacctg gaggaggact tgaaggaggt gctgcgttct gaggctggca 780
tcgaactcat catcgaggac gacatcaggc ccgagaagca gaagaggaag cctgggctgc 840
ggcggagccc atncaagaaa gtccggaagt ctctggctct tgacattgtg gatgaggatg 900
tgaagytgat gatgtccaca ytgcccaakt ytttatcctt ggcgacaayt gccccttgca 960
aantttcca gcct 974

<210> 133
<211> 634
<212> DNA
<213> Homo sapiens

<400> 133
attcggcacg acgggtgaac ctggccacag ctcaccctgg aacagccaca atgtctgccc 60
cttagagaag aaccctgaaa tcagaccagt ttttgcggcc tccccctttc ctctctgtta 120
cagtgccctt tccaggcctt aagagaagta aaacttagct gcagcgtcag gaggtggacc 180
ccagagtgtg agtggcacgc ttctctgtga acccgtcctc accatgtttg ccacatctgg 240
ggcagtggca gcggggaagc cttactcgtg cagcgaatgt ggcaagagct tctgctacag 300
ctcagtgctg ctgcgacatg aacgagctca cggcggtgac ggccgcttcc gttgcctaga 360
atgcggtgag cgctgtgcac gggctgctga cctccgagcg cacaggcgca cgcatgctgg 420
ccagaccctc tacatctgca gtgagtgcgg acaaagcttc cgccacagcg gccgtcttga 480
cctacacttg ggcgcacacc ggcagcgatg ccgcacttgc ccctgccgca cwtgcggccg 540
gcgcttcccg cacctcccgg cgctgctgct acaccggcgc cgccagcatc tgccagagcg 600
gccccgscgy tgcccgctgt gcgycctcag gttt 634

<210> 134
<211> 1855
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1818)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1845)
<223> n equals a,t,g, or c

<400> 134
gcccacgcgt ccggcggcgc gcccgagggc gccgcgtgcg gcctgcagga gggcccgtgc 60
ggcgaggggc tgcagtgcgt ggtgcccttc ggggtgccag cctcggccac ggtgcggcgg 120
cgcgcgcagg ccggcctctg tgtgtgcgcc acagcgagcc ggtgtgcggc agcgacgcca 180
acacctacgc caacctgtgc cagctgcgcg ccgccagccg ccgctccgag aggctgcacc 240
ggccgccggt catcgtcctg cagcgcggag cctgcggcca agggcaggaa gatcccaaca 300
gtttgcgcca taaatataac tttatcgcgg acgtggtgga gaagatcgcc cctgccgtgg 360
ttcatatcga attgtttcgc aagcttccgt tttctaaacg agaggtgccg gtggctagtg 420
ggtctgggtt tattgtgtcg gaagatggac tgatcgtgac aaatgcccac gtggtgacca 480
acaagcaccg ggtcaaagtt gagctgaaga acggtgccac ttacgaagcc aaaatcaagg 540
atgtggatga gaaagcagac atcgcactca tcaaaattga ccaccagggc aagctgcctg 600
tcctgctgct tggccgctcc tcagagctgc ggccgggaga gttcgtggtc gccatcggaa 660
gcccgttttc ccttcaaaac acagtcacca ccgggatcgt gagcaccacc cagcgaggcg 720
gcaaagagct ggggctccgc aactcagaca tggactacat ccagaccgac gccatcatca 780
actatggaaa ctcgggaggc ccgttagtaa acctggacgg tgaagtgatt ggaattaaca 840
ctttgaaagt gacagctgga atctcctttg caatcccatc tgataagatt aaaaagttcc 900
tcacggagtc ccatgaccga caggccaaag gaaaagccat caccaagaag aagtatattg 960
gtatccgaat gatgtcactc acgtccagca aagccaaaga gctgaaggac cggcaccggg 1020
acttcccaga cgtgatctca ggagcgtata taattgaagt aattcctgat accccagcag 1080
aagctggtgg tctcaaggaa aacgacgtca taatcagcat caatggacag tccgtggtct 1140
ccgccaatga tgtcagcgac gtcattaaaa gggaaagcac cctgaacatg gtggtccgca 1200
gggtaatgaa gatatcatga tcacagtgat tcccgaagaa attgacccat aggcagaggc 1260
atgagctgga cttcatgttt ccctcaaaga ctctcccgtg gatgacggat gaggactctg 1320
ggctgctgga ataggacact caagactttt gactgccatt ttgtttgttc agtggagact 1380
ccctggccaa cagaatcctt cttgatagtt tgcaggcaaa acaaatgtaa tgttgcagat 1440
ccgcaggcag aagctctgcc cttctgtatc ctatgtatgc agtgtgcttt ttcttgccag 1500
cttgggccat tcttgcttag acagtcagca tttgtctcct cctttaactg agtcatcatc 1560
ttagtccaac taatgcagtc gatacaatgc gtagatagaa gaagccccac gggagccagg 1620
atgggactgg tcgtgtttgt gcttttctcc aagtcagcac ccaaaggtca atgcacagag 1680
accccgggtg ggtgagcgct ggcttctcaa acggccgaag ttgcctcttt taggaatctc 1740
tttggaattg ggagcacgat gactctgagt ttgagctatt aaagtacttc ttacacattg 1800
aaaaaaaaaa aaaaaaanct cgggggggcg cccggtaccc aattngccct ttaag 1855

<210> 135
<211> 917
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (913)
<223> n equals a,t,g, or c

<400> 135
ggtttttttgc gcgtgcatat ggcggtggcg ggtgggggga agggggagat cctgctgcac 60

tggccgccca agttgggggg cgagctcggt ggtgacgcgc ggccctcacg tgacccarag 120
ctgcagagcg acgcagcctt cggtgcagtc gtcactcgcg tctggctacc agctccccgc 180
tgccctgagc tcggcgggct ggcattcggc ccggggaaaa gcggagcagg tctgcgaggc 240
taagtgtctc cgcggcgcac ctcgcggcga gaatccggag gagaaggaga ctgcaaggat 300
aggcccagga aaacgaagag atggagcagc ctatgcagaa tggagaggaa gaccgccctt 360
tgggaggagg tgaaggccac cagcctgcag gaaatcgacg gggacaggct cgccgacttg 420
cccctaattt tcgatgggcc atacccaata ggcagatcaa tgatgggatg ggtggagatg 480
gagatgatat ggaaatattc atggaggaga tgagagaaat cagaagaaaa cttagggagc 540
tgcagttgag gaattgtctg cgtatcctta tgggggagct ctctaatcac catgaccatc 600
atgatgaatt ttgccttatg ccttgactcc tgccatttat catgagatta atactgtgat 660
tcccgctgtt ttctttttcc ttgcattttc ctaatatgcc tttactgatc cgtttgctgt 720
gaaccctatg ttatttccat gtgtcaagtg ggtcttgtgt tgccagcttc tatttgaaga 780
ttgcctttgc actcagtgta agtttctgtc agcagtagtt tcacccattt gcatggaaaa 840
atttaaagct aataaagcaa tttaaaaagc aaaaaaaaaa aaaaaaaaaa aaaaaamamg 900
ggggggcccg gwnccca 917

<210> 136
<211> 1271
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1236)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1255)
<223> n equals a,t,g, or c

<400> 136
gcaaggcttc ccctctaccc tctctgggcc tctcacaaac gctgagcccc gccccgctga 60
ggcctgtctg cagaatccac ascaaccagc accatgccca tgayactggg gtactggrac 120
atccgcgggc tggcccaykc catccgcctg ctcctggaat acacagactc aagctaygag 180
gaaaagaagt acacgatggg ggacgctcct gattatgaca gaagccagtg gctgaatgaa 240
aaattcaagc tgggcctgga ctttcccaat ctgccctact tgattgatgg grctcacaag 300
atcacccaga gcaacgccat cctgcggtac attgcccgca agcacaacct gtgcggggaa 360
tcagaaaagg agcagattcg cgaagacatt ttggagaacc agtttatgga cagccgtatg 420
cagctggcca aactctgcta tgacccagat tttgagaaac tgaaaccaga atacctgcag 480
gcactccctg aaatgctgaa gctctactca cagtttctgg ggaagcagcc atggtttctt 540
ggggacaaga tcacctttgt ggatttcatc gcttatgatg tccttgagag aaaccaagta 600
tttgagccca gctgcctgga tgccttccca aacctgaagg acttcatctc ccgatttgag 660
ggcttggaga agatctctgc ctacatgaag tccagccgct tcctcccaag acctgtgttc 720
acaaagatgg ctgtctgggg caacaagtag ggccttgaag gccaggaggt gggagtgagg 780
agcccatact cagcctgctg cccaggctgt gcagcgcagc tggactctgc atcccagcac 840
ctgcctcctc gttcctttct cctgtttatt cccatcttta ctcccaagac ttcattgtcc 900
ctcttcactc cccctaaacc cctgtcccat gcaggccctt tgaagcctca gctacccact 960
atccttcgtg aacatcccct cccatcatta cccttccctg cactaaagcc agcctgacct 1020
tccttcctgt tagtggttgt gtctgcttta aargcctgcc tggcccctcg cctgtggagc 1080
tcagccccga gctgtccccg tgttgcatga aggagcagca ttgactggtt tacaggccct 1140

gctcctgcag catggtccct gccttaggcc tacctgatgg aagtaaagcc tcaaccacaa 1200
aaaaaaaaaa aaaaaatttg gggggggggcc cgttanccca tttggccctt taggnggggg 1260
ggttttaaat t 1271

<210> 137
<211> 2017
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (295)
<223> n equals a,t,g, or c

<400> 137
ggaatgtcat cagtgttgac ccgaatgatc agaaaaagac agcttgttat gacattgatg 60
ttgaagtgga tgacaccttg aagacccaga tgaattcttt tctgctgtcc actgccagcc 120
aacaggagat tgctactcta gacaacaaga caatgactga tgtggtgggt aaccararga 180
rgagcgccga gctgagttct acttccagcc ctgggkcagg aggctgtgtg ccratacttc 240
tactccaagg tgcagcagag acgacaagaa ttagagcaag ccctgggaat ccggnataca 300
tagggcctct cccacagccc tgattcgact gcaccaattc ttgawttggg ccctgtgctg 360
cctgcctcat agtatctgcc ttggtcttgc ttggggcgtt ccaggggatg ctgttggttc 420
aaggacaaca ccagaatgaa gagggtctca caagacacct gttatcctct tctttcaccc 480
tatctcttcc caccccagc ttccctttgc cccacaaagt tcccatgtgc ctgtaccctc 540
ccctggtcta cataggacct ctagatagtg ttagagagag aacatgtagt ggtaatgagt 600
gcttggaatg gattgggcct caggccaggt ggtcttcaag gggaccagct aactgatcct 660
gcccttcaga gacccaggag ttgggagctt tcgctccttc tccaagactc aggcctgtgg 720
gcactctata agctagttga tcttggctct cctgataaca gaatccaatt tccttccttc 780
cctccacagg tttggaacaa actctccctt cacttgttgc cctgtagcac tacagaaacc 840
ctggttcttg ggctccactg gccccagggt cagtccccag ccctctgggt tgrcctgctg 900
tcagtgcttc tytcactcct tagttggggt ccacatcagt attggagttt tgttctttat 960
tgctccctcc cagacactcc ctgtggctgc cctttgtgat tccctcagat ctgccctaat 1020
cccgggcatt tgggtggggg aatcttgcct ttccctttca gagccccagg gatctcatct 1080
ggggaactgt cattgccagc agaggctgtt ccttcctgct gtttggagat gtgactcatt 1140
cattcactca ctccaccctg cctctgcatc ccttaatgga gaaacgggcc taaaaccaaa 1200
cgggtaaaaa gccctgggcc atccctgtct tcctgtccct tgtctgccca gttgacacct 1260
actggtgact tctagggcac tgaggagtga aagcgcctag ggctggagaa tagcgctgag 1320
ttgggtttgt gactcttccc tctccctgcc tcacaggatt gtgactcccc agcccctgcc 1380
ctcaaagctt cagacccctc aggtagcagc aggaccttgt gatcttggcc ccttggatct 1440
gagatggttt ttgcatcttt ccaggagagc ctcacattct tcttccaggt tgtatcaccc 1500
ccgagttagc atatcccagg ctcgcagact caacacagca agggtgggag acagctgggc 1560
acaaaggggg aattccgttc agcatgggct ctaaacccac agaactgaca aagcccctgc 1620
ttccccaccc cctcctcagg ctcctgcgag cacaccccca cccccaaatc cctccctgtt 1680
ctacactggg gacagcagaa ttttctcccc gtcttccccc tcctgccatt ttccctccct 1740
tgaaaggttg acactggaca accttggggc agctgagccc tggccgcctc ctggctggaa 1800
ccatgagaag gaagctcagt acttcccaca gtgtccctgt tgataactgt ttttattaac 1860
tgaattgttt ttttcatgga ccaaacttttt ttttgtactg tccccttatt gatgttaccc 1920
agttttaata aaagaatctt ctgaaggatg ggtcctccta cctactgtga gagagctctt 1980
ccctgagctc ttcttccttc aataccatta aaaaaaa 2017

<210> 138

<211> 937
<212> DNA
<213> Homo sapiens

<400> 138
gattcaaaca ggcaacaatg acctttttatt ttctgtttgt ccccacctcc ccagccttcc 60
acctcctgtt cttcctacct tcttcctttt tgactaaata atccccacct cccttgatca 120
tacagtgagg ctacagtgac tgaggggaga atccctcctg ttcactctcc caaccctgct 180
ccagcccctc agcttcccag accctcatgc agttggttgt aaattctccc aggagctgtt 240
ttactgtcta cttttcagga ttaaaaaaaa aatcaaaact taaaaaaaaa aaagtttaaa 300
aagcaaaatg gggaggggga ggaagcagtg actttttttt ggtaattatg cgctttttt 360
taatttttag aatttgtctt tttactgtgg gtgggctgtt gatatttcat caagataagc 420
atttctttcc tgagttcagg tgactgagga agagccacaa aacaaaacac aacaaaacca 480
aaccacagaa tcatctttaa cccaactttt tatacgatgc cccagttccc cataactttg 540
cacacaagct tctgtgttca gttgaattgt aactgctttt tgtatttgga gagagtgact 600
attgaacttg aaaccttta ttccgggcgt cttggtagtt tctggtggga ttcagtgggt 660
gagagggaag aaggggaggt tgggggctc cttcccttca gaacttgaag tttctcccac 720
tgcctcctct ccagtggtct cccaggtgcc agacccaaaa gcttttccta cagtgatacc 780
ctttattttt acttcccctt gactcatatg ttttaacatg attttaacaa actgcactta 840
ttaagaaatg tgtttgccct gttttgtttg gtttcgtttt gttttctttg aataaatgac 900
atggcacctc ctagcaggaa ggaaaaaaaa aaaaaaa 937

<210> 139
<211> 2759
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (171)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1654)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2743)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2744)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2746)
<223> n equals a,t,g, or c

<400> 139
gctagtctca caggaaccca ggcgttgccc ccactcttct ccctcggcta ccaccagagc 60
cgttggaact accgggacga ggctgatgtg ctggaagtgg atcagggctt tgatgatcac 120
aacctgccct gtgatgtcat ctggctagac attgaacatg ctgatggcaa ncggtatttc 180
acctgggacc ccagtcgctt ccctcagccc ygcaccatgc ttgascgctt ggcttctaag 240
aggcsraagc tggtggccat cgtagacccc cacatcaagg tggactccgg ctaccgagtt 300
cacgaggagc tgcggaacct ggggctgtat gtwaaaaccc gggatggctc tractatrag 360
ggctggtgct ggccaggctc agctggttac cctgacttca ctaatcccac gatgagggcc 420
tggtgggcta acatgttcag ctatgacaat tatgagggct cagctcccaa cctctttgtc 480
tggaatgaca tgaacgaacc atctgtgttc aatggtcctg aggtcaccat gctcaaggat 540
gcccagcatt atgggggctg ggagcaccgg gatgtgcata acatctatgg cctttatgtg 600
cacatggcga ctgctgatgg gctgagacag cgctctgggg gcatggaacg ccccctttgtc 660
ctggccaggg ccttcttcgc tggctcccag cgctttggag ccgtgtggac aggggacaac 720
actgccgagt gggaccattt gaagatctct attcctatgt gtctcagctt ggggctggtg 780
ggactttcct tctgtggggc ggatgtgggt ggcttcttca aaaacccaga gccagagctg 840
cttgtgcgct ggtaccagat gggtgcttac cagccattct tccgggcaca tgcccacttg 900
gacactgggc gacgagagcc atggctgtta ccatctcagc acaatgatat aatccgagat 960
gccttgggcc agcgatattc tttgctgccc ttctggtaca ccctcttata tcaggcccat 1020
cgggaaggca ttcctgtcat gaggcccctg tgggtgcagt accctcagga tgtgactacc 1080
ttcaatatag atgatcagta cttgcttggg gatgcgttgc tggttcaccc tgtatcagac 1140
tctggagccc atggtgtcca ggtctatctg cctggccaag gggaggtgtg gtatgacatt 1200
caaagctacc agaagcatca tggtccccag accctgtacc tgcctgtaac tctaagcagt 1260
atccctgtgt tccagcgtgg agggacaatc gtgcctcgat ggatgcgagt gcggcggtct 1320
tcagaatgta tgaaggatga ccccatcact ctctttgttg cacttagccc tcagggtaca 1380
gctcaaggag agctctttct ggatgatggg cacacgttca actatcagac tcgccaagag 1440
ttcctgctgc gtcgattctc attctctggc aacacccttg tctccagctc agcagaccct 1500
gaaggacact ttgagacacc aatctggatt gagcgggtgg tgataatagg ggctggaaag 1560
ccagcagctg tggtactcca gacaaaagga tctccagaaa gccgcctgtc cttccagcat 1620
gaccctgaga cctctgtgtt ggtcctgcgc aagnctggca tcaatgtggc atctgattgg 1680
agtattcacc tgcgataacc caagggatgt tctgggttag ggggagggaa ggggagcatt 1740
agtgctgaga gatattcttt cttctgcctt ggagttcggc cctccccaga cttcacttat 1800
gctagtctaa gacccagatt ctgccaacat ttgggcagga tgagagggct gaccctgggc 1860
tccaaattcc tcttgtgatc tcctcacctc tcccactcca ttgataccaa ctctttccct 1920
tcattccccc aacatcctgt tgctctaact ggagcacatt cacttacgaa caccaggaaa 1980
ccacagggcc cttgtcgccc cttctctttc ccttatttag gagccctgaa ctcccccaga 2040
gtctatccat tcatgcctct tgtatgttga tgccacttct tggaagaaga tgagggcaat 2100
gagttagggc tccttttccc cttccctccc accagattgc tctcccacct ttcatttctt 2160
cctccaggct ttactccccc ttttatgccc caccgataca ctgggaccac cccttacccc 2220
ggacaggatg aatggatcaa aggagtgagg ttgctaaaga acatcctttt ccctctcatt 2280
ctacccttt cctctccccg attccttgta gagctgctgc aattcttaga ggggcagttc 2340
tacctcctct gtccctcggc agaaagacgt ttccacacct cttaggggat gcgcattaaa 2400
cttcttttgc ccccttcttg tcccctttga ggggcactta agatggagaa atcagttgtg 2460
gtttcagtga atcatggtca cctgtattta ttgctaggag aagcctgagg gtgggggggag 2520
atgatcatgt gtgctcgggg ttggctggaa gccctgggtg gggggttggg ggaggactaa 2580
tggggagtcg gggaatattt gtgggtattt tttttacttc ctcttggttc ccagctgtga 2640
cacgttttga tcaaaggaga aacaataaag ggataaacca taaaaaaaaa aaaaaaaaaa 2700
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aannanaaaa aaaaataaa 2759

<210> 140
<211> 1241

<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (317)
<223> n equals a,t,g, or c

<400> 140
tcgacccacg cgtccgggag aacgggcgga gggcgcgggc cgaccgggcg caccgaccat 60
ggcctccaaa tgccccaagt gcgacaagac cgtgtacttc gccgagaagg tgagctccct 120
ggggaaggac tggcacaagt tctgcctcaa gtgcgagcgc tgcagcaaga cgctgacgcc 180
cgggggccac gccgagcatg acgggaagcc gttctgccac aagccgtgct acgccaccct 240
gttcggaccc aaaggcgtga acatcggggg cgcgggctcc tacatctacg agaagccccc 300
ggcggagggg ccgcagntca ccggccccat cgaggtcccc gcggcccgag cagaggagcg 360
gaaggcgagc ggccccccga aggscccagc agagcctcca gtgtcaccac tttcaccggg 420
gagcccaaca cgtgcccgcg ctgcagcaag aaggtgtact tcgctgagaa ggtgacgtct 480
ctgggcaagg attggcaccg gccctgcctg cgctgcgagc gctgcgggaa gacactgacc 540
cccggcgggc acgcggagca cgacggccag ccctactgcc acaagccctg ctatggaatc 600
ctcttcggac ccaagggagt gaacaccggt gcggtgggca gctacatcta tgaccgggac 660
cccgaaggca aggtccagcc ctaggctaca gcggctctca tgatgtgggc tcacctgcgc 720
cccagaccct gcaggggccc ccctgcttgg ctctgctggg agagtgctca gccgcccagt 780
cctgcctgca agcccagggc gagtattgga ggaggggcag ccacgggcag agcaccatgc 840
ccatccccga gtctctggtg tgtctgcccc ctctggcatc ctctgggcgt cccatgatcc 900
cttctgtgtc tgcgtgtccg aatccccgtg tgaccctgtc ccagcatttt cccgccgacc 960
ctgcgtgtcc ccgtggcgct gtccgctctc cctctcctgc tgcccaccca cctgccagtg 1020
ttatttatgc tcccttcgtg ggtgatggcc acgccctcac catgtccctg gcagagggct 1080
tcctccggga tcccctgcct ggtgcccaca ctgcctcgca agcgctcgcc accctcacgt 1140
ggctcacctg ctgttgagcc ttgtgctgtc aataaacggt ttgaggattg caaaaaaaaa 1200
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa g 1241

<210> 141
<211> 3405
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1569)
<223> n equals a,t,g, or c

<400> 141
cctttccgat acgtcctaga cccacctgcc cgccggatct ggaataatgt gactcgctgg 60
tttgtcacgt gtgtccggca gccagaattc cgagccgtgc taggagaagt ggttctatac 120
tcaggagcca ggcctctctc tcatcagcca ggccccgagg ctcctgccct cccaaagaca 180
gctgctcagc tcaagaaaga ggcaaagaaa cgggagaagc tagagaaatt ccaacagaag 240
cagaagatcc aacagcagca gccacctyca ggggagaaga aaccaaaacc agagaagagg 300
gagaaacggg rtyctggggt cattamctwt gacytcccaa ccccamccgg ggaaaagaaa 360
gatgtcagtg gccccatgcc cgactcctac agccctcggt atgtggaggc tgcctggtac 420
ccttggtggg agcagcaggg cttcttcaag ccagagtatg ggcgtcctaa tgtgtcagca 480
gcaaatcccc gaggtgtctt catgatgtgc atcccacccc ccaatgtrac aggctccctg 540

cacctgggmc atgcactcac caacgccatc caggactccc tgactcgatg gcaccgcatg 600
cgtggggaga ccaccctgtg gaaccctggc tgtgaccatg caggtattgc cacccaggtg 660
gtggtggaga agaagctatg gcgtgagmag ggactgagcc ggcaccagct gggccgcgag 720
gctttctaca ggaagtctgg aagtggaagg aggagaaagg tgaccggatt taccaccagt 780
tgaagaagct tggcagctcc ttggactggg atcgagcctg tttcaccatg gaccctaaac 840
tctcagcagc tgtgacagag gcctttgtcc ggcttcacga ggaaggcatc atctatcgca 900
gtacccgcct tgttaactgg tcctgcaccc tcaactccgc catctctgac attgaggtgg 960
ataagaagga gctgacaggt cgcaccctgc tctccgtgcc tggctacaag gagaaggtgg 1020
agttcggggt cctcgtgtcc tttgcctata aggtccaagg ctcagatagc gacgaggagg 1080
tggtggtggc aacaactcgg atcgagacaa tgctgggaga tgtggctgta gctgtgcacc 1140
ccaaagatac cagataccag cacctgaagg ggaagaacgt gatccaccca ttcctgtctc 1200
ggagccttcc cattgtcttc gatgaatttg tggacatgga ctttggcaca ggtgctgtga 1260
agatcacccc cgcacatgac caaaatgact atgaagttgg gcagcggcac gggctggagg 1320
ccatcagcat catggactcc cgggggggccc tcatcaatgt gcctccgcct ttyctgggcc 1380
tgcccaggtt tgaggccagg aaagcggtgc tggtggcgct gaaggagcgg ggactgttcc 1440
gtggcattga ggacaacccc atggtggtgc cactttgcaa ccggtcgaag gacgtggtag 1500
agcctctgct gcggycgcat gggtacgttc gctgcgggga gatggcccag gctgccagcg 1560
ccgctgtgna ctcggggtga cctccgcatc ctgcctgagg cccatcagcg cacatggyat 1620
gcctggatgg acaacatccg ggagtggtgc atttccaggc agctktggtg gggccatsgc 1680
atcccagcct actttgtmac tgtmagtacc cagcggtgcc ccctggggag gaccctgaat 1740
gggcggtact gggtgagtgg acgcaatgag gcggaggccc gggagaaggc agccaaggag 1800
ttcggagtgt cccctggaca agatcagtct ccagcaagat gaggatgtat tggatacctg 1860
gttctcctct ggcctcttcc ccttatccat tttgggctgg ccaaccagtc agaagacctg 1920
agtgtgttct accccgggac actgctggag accggtcatg acatcctctt cttctgggtg 1980
gcccggatgg tcatgctggg cctgaagctc acgggcaggc tgccytttag agaggtctac 2040
ctccatgcca tcgtgcgaga tgctcacggc cggaagatga gcaagtctct aggcaatgtc 2100
atcgatcccc tggacgtcat ctatggaatc tccctgcagg gcctccacaa ccagctgctg 2160
aacagcaacc tggatcccag cgaggtggag aaggccaaag aagggcagaa agctgacttc 2220
ccagcgggga ttcctgaatg tggcaccgat gctctccggt ttggattatg tgcctacatg 2280
tcccagggtc gtgacatcaa cctggatgtg aaccggatac tgggttaccg ccacttctgc 2340
aacaagctct ggaatgccac caagtttgcc cttcgtggcc ttgggaaggg ttttgtgccc 2400
tcacccacct cccagcccgg aggccatgag agcctggtgg accgctggat ccgcagccgc 2460
ctgacagagg ctgtgaggct cagcaatcaa ggcttccagg cctacgactt cccggccgtc 2520
accactgccc agtacagctt ctggctctat gagctctgtg atgtctactt ggagtgcctg 2580
aaacctgtac tgaatggggt ggaccaggtg gcagctgagt gtgcccgcca gaccctgtac 2640
acttgcctgg acgttggcct gcggctgctc tcacccttca tgcccttcgt gacggaggag 2700
ctgttccaga ggctgccccg gaggatgccg caagctcccc ctagcctctg tgttaccccc 2760
tacccggagc cctcagagtg ctcctggaag gaccccgagg cagaagccgc ccttgagctg 2820
gcgctaagca tcacgcgagc cgtgcgctcc ctgcgggccg actacaacct cacccggatc 2880
cggcctgact gtttcctgga agtggcggat gaggccacgg gcgccctggc atcggcggtg 2940
tcgggctacg tgcaggccct ggccagcgca ggtgtggtgg ctgttctggc cctgggggct 3000
cccgcccccc agggttgcgc tgtggctctg gcttctgatc gctgctccat ccacctgcag 3060
cttcaggggc tggtggaccc tgcacgggag ctgggcaagc tgcaagccaa gcgagttgag 3120
gcccagcggc aggcccagcg tctgcgggaa cgccgtgctg cctcgggcta tcctgtcaag 3180
gtgccgctcg aagtccagga ggcagatgaa gccaagctcc aacagacaga agcagagctc 3240
aggaaggtgg atgaggccat cgccctattc cagaagatgc tgtgatccac cacccagctt 3300
caccctcac ccccagcggc tcaccatggg gatggcagca ataaaatatt ttcccacaaa 3360
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaa 3405

<210> 142
<211> 2268

<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (2169)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2196)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (2232)
<223> n equals a,t,g, or c

<400> 142
gcctgcctcg agaggtgtgg ctcctggaga ccccacaggc cgatgacttc tggtgcgagg 60
gagaacccta tccaggtccc aaggtcttcc cttgaagcca ctggcgccca ggagcggtgg 120
gccgaagacg tgccctaccc taccacaagg gctgtgtctc tacccctag cctgggcgtt 180
ggatctactg gaatgagcag cagccgcttc ctcggcagcc ttgggaagca cgggcgactg 240
gacagcagcc gccgggcacg gttatggggg cggggtgggc ggggaggcta gattgtttcc 300
tggtactgtc actgccactg gggctttgat ttggaggaat ggggcagggg actatctgaa 360
gcgcttccat cctaaagcca taatgaaaat atcttcctct cttccccatt ctatacaaaa 420
tactaagtgg ttttcttgct cccactccct acccccttagt taaatagggt ttattttcca 480
ctcatgccct tatgcctttt tttcttatag ttttttaact tattgactgt gcatgaccca 540
gtggtttgaa ttgtttttag ttcaagtcat tggtaaaaac taggtttaag gagatgagct 600
actgtttaaa gtgagctggc ctgcctaatt aattccttgt gaaaactaaa tgatttttc 660
agtttgggga tcattctcac aacataacta tgcatgtaga ggacaagatt tattttcttt 720
cctccctttg cccagtagcc acatctggtt tactcaggca gcatctacta agaaattcag 780
cacctgcata tctctgtgac atggtcactt agagcttatc ttccctatga atctccagat 840
ctgtgagtcg agcagatttc atgttgcaga ttcaccttta atgcaaagac tgtattatcc 900
tcacatgact ttttttcttg tcttactgta ccttaaaagg tgatagagta attctgtatt 960
ttctaacggg aagattcaaa ggagctgaat gtgttatgct tccaaacaac tgaatgtaaa 1020
acactcctag ccagttgttg cattccctat atttatttac ttccaatatt ttactgtaaa 1080
agtagggaga aatattatgt tgatagttgt ttcatattct ctcaggaact ttaatgttcc 1140
cgactcgggt gattccagct gtgttgctgg cagtgttgtc tcaaccctct ccctaaaatg 1200
actgagccct gggttcatct aatgtggttt tccttaggaa gagatagaag gcacagaaga 1260
tcacagctag agaattgaga attaactata ctactagcca ttttagggca ccaaaacttg 1320
ggattaaaca cttcctactt cccactccca actcctgaaa tgaagtcttg ctatctgtga 1380
ctagttttat ttttgtgctt ttaatagtcc gagcagtctt accttgttta cacatgtatt 1440
gacaccattt gcttcaggcc atggagcact gtttctccct ttttactatt tataggattc 1500
cgtttttttca caagactttt aataaaaaga aattgtagaa ataaacacat taaaatttgc 1560
ccagctgtcg tctaagccct cttgattgac ttgcccaagt ggcaatagag ttctaatatc 1620
tataataaag ggagatttgc tattattagt ggaatgttga ccccgtatgt agagaaacag 1680
tacgtgcctt tscctcttta tgcacacaga gacccagggt gagggagtat ttgttcccag 1740
tttttaagat agtataaaaa agcaaatact tggtgagtga tttaaaaata aaaccaaaac 1800
aaaacacaaa aagatattcc acaggacatg ccactttatt ataaaacctg acacaggcat 1860
agtaccaagt atttcctgca ttgttgctaa aattgtttta ttgtagctcc acattctggt 1920

gtagtttaaa atgcctttgg gggcagtttg aagcagttct tcatgccact tagtttgaaa 1980
ataaaattct agrtatgcaa atgattttct tagaaaactt cacaaaataa aagatcttgt 2040
ttttttttcca tagcacagta atgaatgtgg ttatcaatca catacttttt tggattatat 2100
tgtagcaaaa agttgattag cttaccaaga ttattaatag caatgtatgt gttataatac 2160
aacttagtna cattaaagcc tacgaaaact catccnggct gtaggatagt aataaaggaa 2220
gaattatgac tncattatga aaaaaagaag ttttaaagtt ttcaatac 2268

<210> 143
<211> 1757
<212> DNA
<213> Homo sapiens

<400> 143
aattcggcac gagagcagca tcttatcagt tttgtttatt cgatttctaa aatgtgctga 60
tccttttaaa actcctgctt atctctgcaa caaagaaaaa tattcaaaaa tactgccttc 120
attttcacac acagtgctga agatgctgca agaccaaatc atagctcata aaatcaggtc 180
ctgagatagt tacccataaa gaggaatcct ttgagtgtat gccattggtg agccgatgag 240
catggaccat agaagggctc aatgtagaag gtaaaattgg caaatcataa ttgagaaata 300
tgaaatgtat tcccatacat aatatggtat agggtgtaat gtacctgctt ttgatcactt 360
ttcattttaa agtgctattc acttgatctt aaatgttcca tgaactgtta aatttcttaa 420
gttacatagt tactacacca catttatgtg tatgttatgt tttaatagtc aatgataggt 480
atgtacaatt gataatataa aggggctcat tgaaacttga gagcctgttg agttttggtt 540
agttgtagat tgcattttta taaaaaaaaa tacagataga ttgatgataa tagatattgg 600
ggcattgttt ctgtctcatg agaattcttt tattcattac cataagcctt cactgatact 660
ataagcatta ttttaaatga cgctgatctt aagtctgaaa taaatggaaa gcagaaaagg 720
tgagccagtt gatttgaatg cattggatat tagtgttaga aacaatgtat agtttagatt 780
gaaactgaac tgacttattt agcacttaaa caaaaatttg acaatgtttt tagtttttt 840
taagacagct tagtgtggtg atacttagaa ttctatggtt tgatgtttct tttagaaatg 900
agaagtatag ttttattttt taatataaaa aatggtttta atactaaaac tagtaatttg 960
atactagttg tttataaaca ttgtaaaata tatcttttaa acaaattatc ttggtagtta 1020
attcataagg gtgggtttgg gtaggaatag cagagtactt tcagagggaa aggggagtca 1080
ttcagaagtg atagcatttt atttgtttga atactctgcc agtaaaatca gctgtactta 1140
gaaagttatc tgttgtgtag aataatgatg tagagtttac taatcagtga ggatgtcttg 1200
tttttatttt ctgcaaactc tgcctcactt taaaatgcat tataacaata cctaattaaa 1260
gataattttg gctctgaaag ttaccttatt ttttgttgag ttagtgactt catttttctt 1320
gccacaatat aagcttttga gggatttttt taaattggtg cttttaataa gcaaataaat 1380
cccagggttt tattttcttc agtgataccc ctatagaaac tcttaaatgt atttgcgcat 1440
atatatatat atattttctt atgcatgctc gatgcatttt cgtcctgaga aaaatgttct 1500
ctacagaaac tacccgtgtg taaaaagaag attggcttaa aatggctact gtgatgggaa 1560
cagtgtctta gggagatgca gcttggactt gaggtaaatt gaatacttta caactgtggt 1620
ttagagtttg ctttaatgac attgtatgta aaaggtcaca tgattgctgt aattttgtat 1680
tcattatggt ttcctcaata aatgtacatt gatgactatt aaaaaaaaaa aaaaaaaaaa 1740
aaaaaaaaaa aaaaatt 1757

<210> 144
<211> 1062
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature

<222> (52)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1056)
<223> n equals a,t,g, or c

<400> 144
acccacgcgt ccgcccacgc gtccgcctgg actgtgaccc agccagcacc gnctctccta 60
gtggcaactg gctgggaatg gctgaggggc tacctactgc ttgcggcctg ccagcgggag 120
gaggggggcg gaaagaagaa agggggcggg gttgaggggg gcgggcctgg acctggggag 180
tgaaagcgaa agcccgggcg actagccggg agaccagaga tctagcgact gaagcagcat 240
ggccaagccg tgtggggtgc gcctgagcgg ggaagcccgc aaacaggtgg aggtcttcag 300
rcagaatctt ttccaggagg ctgaggaatt cctctacaga ttcttgccac agaaaatcat 360
atacctgaat cagctcttgc aagaggactc cctcaatgtg gctgacttga cttccctccg 420
ggccccactg gacatcccca tcccagaccc tccacccaag gatgatgaga tggaaacaga 480
taagcaggag aagaaagaag tccctaagtg tggatttctc cctgggaatg agaaagtcct 540
gtccctgctt gccctggtta agccagaagt ctggactctc aaagagaaat gcattctggt 600
gattacatgg atccaacacc tgatccccaa gattgaagat ggaaatgatt ttggggtagc 660
aatccaggag aaggtgctgg agagggtgaa tgccgtcaag accaaagtgg aagctttcca 720
gacaaccatt tccaagtact tctcagaacg tggggatgct gtggccaagg cctccaagga 780
gactcatgta atggattacc gggccttggt gcatgagcga gatgaggcag cctatgggga 840
gctcagggcc atggtgctgg acctgagggc cttctatgct gagctttatc atatcatcag 900
cagcaacctg gagaaaattg tcaacccaaa gggtgaagaa aagccatcta tgtactgaac 960
ccgggactag aaggaaaata aatgatctat atgttgtgtg gaaaaaaaaa aaaaaaaaaa 1020
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaanaaaa aa 1062

<210> 145
<211> 1030
<212> DNA
<213> Homo sapiens

<400> 145
aaactgactg gggtcaattc aagtcatgca ggctgtgaga aacgcggggt cgcggttcct 60
gcggtcctgg acttggcccc agacagccgg cagggtcgtg gccagaacgc cggccgggac 120
catctgcaca ggcgctcgac agctccaaga cgctgcggcc aagcagaaag ttgaacagaa 180
cgcggctccc agccacacca agttcagcat ttaccctccc attccaggag aggagagctc 240
tctgaggtgg gcaggaaaga aatttgagga gatcccaatt gcacacatta aagcatccca 300
caacaacaca cagatccagg tagtctctgc tagtaatgag ccccttgcct ttgcttcctg 360
tggcacagag ggatttcgga atgccaagaa gggcacaggc atcgcagcac agacagcagg 420
catagccgca gcggcgagag ytaaacaaaa gggcgtgatc cacatccgag ttgtggtgaa 480
aggcctgggg ccaggacgct tgtctgccat gcacggactg atcatgggcg gcctggaagt 540
gatctcaatc acagacaaca ccccaatccc acacaacggc tgccgcccca ggaaggctcg 600
gaagctgtga tgggaaggag gcctgcactt ggacctgacc tcaagcctca gctccagtgg 660
gaccttgtaa aatgctccct gtcagagctc tccagaatat gcttgttgga gatccttcag 720
gcagtaaggg agagttttgc ctccttacac agtggccttt gcttgcacct ccagctggag 780
atgggtgtgc cccagaagta agctttgcat ctcttacaag aggggagcta caggggcagc 840
cgtgcctagg cccaaactct gctctgagaa aataaatatc tgtaccacct gtcataattt 900
tgagattttt tgctttcaga gttacgtaat tcctaattcc tcttgaaaaa gagagtgtga 960
aatgaggtga ggcctcagat gaaagtaaaa tataaatgtg agttgctatt taccagaaaa 1020

aaaaaaaaaa 1030

<210> 146
<211> 814
<212> DNA
<213> Homo sapiens

<400> 146
ggcacaggcc aggtcgtgcc agcatccgcc ggacgccgga agtggttctc cgcccctgcc 60
actgggccat ggagactgtg gcacagtaga ctgtagtgtg aggctcgcgg gggcagtggc 120
catggaggcc gtgctgaacg agctggtgtc tgtggaggac ctgctgaagt ttgaaaagaa 180
atttcagtct gagaaggcag caggctcggt gtccaagagc acgcagtttg agtacgcctg 240
gtgcctggtg cggacaagta caatgatgac atccgtaaag gcatcgtgct gctcgaggag 300
ctgctgccca aagggagcaa ggaggaacag cgggattacg tcttctacct ggccgtgggg 360
aactaccggc tcaaggaata cgagaaggcc ttaaagtacg tccgcgggtt gctgcagaca 420
gagccccaga acaaccaggc caaggaactg gagcggctca ttgacaaggc catgaagaaa 480
gatggactcg tgggcatggc catcgtggga ggcatggccc tgggtgtggc gggactggcc 540
ggactcatcg gacttgctgt gtccaagtcc aaatcctgaa ggagacgcgg gagcccacgg 600
agaacgctcc aggagggcct gtccatcctc gctgtccttt ccctgttctc cccctgcccc 660
ccgtctctat cctctgtggc cttcagctaa tttctgctcc cctgagattc gtccttcagc 720
cccatcatgt gctttgggat gagtgtaaat aaaacggggc tgtggcttgg gaaaaaaaaa 780
aaaaaaaaaa aaaaaaaaaa aaaaaagggg gggg 814

<210> 147
<211> 2678
<212> DNA
<213> Homo sapiens

<400> 147
cccacgcgtc cggatgaaca cgatgagaat aatgctgaag ctagtgctga attatcaaat 60
gaaggggtaa tgaaccatag aagcgaggaa gaacgtgtaa ccgaaacaca gaaaaatgag 120
cgtgttaaga agcaacttca ggcattaagt tcagaattag cccaagccag agatgaaacc 180
aagaaaacac aaaatgatgt tcttcatgct gagaatgtta aagcaggccg tgataagtac 240
aagactctgc gacagattcg acaaggcaat acaaagcagc gtatcgatga gtttgaagca 300
atgtgagagc tgttattttg catatatgtt cttcataagc tgaaccacca acagagaaaa 360
gcaggccttt gcagatatga tggaatgcat cccaccttgc caaagcactt acaccagttt 420
gactgtgcta gctaaaagac aaatttaagg ggagctcttc aacattaagg cagtatgata 480
tcatgcttgg ttttcttttt tcttttggtc cagggaatgg agaatggtgt tccattgcct 540
cttttcacat tttttttctt tttcttttt ttttctgttg aagattaaca ctaattatca 600
cgtctgacaa atgtgtatgt gtggtttcag ttctgtgtac attttaaagg ataatggtga 660
acattttaat gggtttccct tgccctttcc atatttaacc tatttccaca ttctctctca 720
ctcacatttt ctcagtgtgc ccttctctta tctgccatgt ccatagccat aattccacca 780
tcatacagat caggcagtgt ttaaaatgat ggtaggtagc acagtggaca gtctttgatc 840
atcatgtaga atatggctat gaatcaggaa agagattaga acatttaata atgtatgtac 900
agctggtgct tagtttttt ttaatctaaa tttaattacc ttattggata tttgatattt 960
ggttatttaa tcacagtcat ctttaacagc ttacactgat tggtgtttta tctcctgtga 1020
tcctttgatg gctttttttg cctaccattt cacagaggtt tagacagcag tagtagctcc 1080
ctaggagagt ttactgatga aacagcctct gcaagatttt aaaagttttg ttcttttata 1140
gactgattta gaaaaacaaa tgattagtta aaaaaagaaa atatacattt gttggtaact 1200
aatgttattt tttaaaacct ggacctttcc tggragggca gcatataara acatcagtgc 1260
ccgaggaggg gacaacaata ctacctcact actacatctg tgatgactgg ttgttcaaac 1320

acaatggagt gtgtaaggta tatgttttat aattcataac catagcctcg atcatcaaga 1380
aatactttcg aaatttcatt ttccttcaga atatcttaag agtgctaaat ttttaactgc 1440
ctttttgtcg agtcaaactg tgggattctg atttgtatta aaattgtaag ctcctcactg 1500
gtatactatc atcctggagg ggtgttgtat ggctgagcaa gagagagaga gaatgagaga 1560
gagactgtgt gtgtgtgtgt gtgtgtgtgt actctgtgtg tgtatgagag agagaaatgc 1620
taaccttgta gcatgtgaag aatgtctgta ccttgatacg atagttacat aatcagtata 1680
tttggtttct agatcactgt gcttattttg tttcaatctc tgactaaaaa tacttaaatt 1740
tggtttgtta attcttattt tagaaattat aattttagtt tatattaatt tcggttatag 1800
cttactgaag aaatctttcc agttagaagg aggttctaat attcacatgt tctaatactt 1860
tgtttattgt aaaacagcta aatttggaga tacgtaaagc cttgttttct ctgtgtggtt 1920
cagctacttt ccatttggta ttacacagtc aaatttacat ttatctatta aaattgccat 1980
tttattaaac attttcatgc acagtagatt caagttgtgt ctgaaaatat ctcttgtgct 2040
tttttgattt tgctgacttt aaaaggatta atctgggcag acattatgta aaagaaaggt 2100
tgcgtttaat atatttttg aactttgtag gacaaaacat agctggttaa ccttgaagtg 2160
actgttgtac catggttgtg cacatgcttc agaatcctat ggaagagaat attcctactt 2220
gcagtacatc aaaggaatgg atggtggacc ctactattca tgttttgaga cataaatgtt 2280
cactttaaag caattgcata atagataaaa acctgaactt tcattggatt tttgttaatt 2340
ttcctcattt tgaattatgt gcactaccat agctacatca gtttgataca gtattgaaaa 2400
attatcagtt atattttgcy gtttatgrtc tatttgtagr ttaggrttaa aatggrttta 2460
atccattttt aaggstgtgt gaatttttct aaacaagaac catttgcaat atggatttct 2520
tagagattaa accaattata acttattagc agtsgcgagc acatgttcat atagtcaatg 2580
taaaaataca ctaatgagta tttggtaaat cccagtaggc ttttaccatt agcataattt 2640
tgtgttgtac ctcggccgcg accacgctaa gccgaatt 2678

<210> 148
<211> 1028
<212> DNA
<213> Homo sapiens

<400> 148
ctgcctcagc ctcccgagta gctgggatta caggcacaca ccaccacgcc cggctaattt 60
tttgtgtctt tttagtagag acggggtttc gctatgttgg ccagactggt cttgaactgc 120
tgacctcgtg atccgcccgc ctcggcctct caaagtgctg ggattctgtg tgttttgtgc 180
acctccactt taggtaatca tagggagcac atttacagga tggtctaata acatgaaaac 240
aggctagttt caagcaacag caatgtcggt tggaaagcag gcgtcatttg ccttgaaaaa 300
agccttttga caacatacag gcattctttt aaaaccaggc tgaaacattt tatttccgag 360
acttaacgtt gtgtttcctg tttcttaaac ctagcacctc tgtgtatttg aaaataatga 420
gacatctttc attggatttt ggaaaattgt tccccatggg attctaacct cactaccaaa 480
tgagtgaaag cttgattaag agttcttcca tatactagcc tccttggaag aagtgatcag 540
aaggtgataa gaaggacaga aaggactatt ttaaagttgg actgaaggag aaaaaagcaa 600
aattcttgtt tcatcccaat tctagttaga acaaagttaa acccccgtaa tcttaaagag 660
aaaatctttg gaggttttaa ttaaacattt tatacattta aagtcttgtt aatggtgctt 720
taagtgtcaa tgtagcatgt aaaaggcttt gtacagacag gtaaaagttc catttctgag 780
tgatgaaatg taacacttct tcatctttaa cttgaaatca aaactatcag attttatttt 840
tgtataattt aaggaaggta aagttagggg actagaagac tctaaattgg cttctacaga 900
tcaataattt aaatgtaact agttgggatt ttatagttaa aattatattt gtgtatataa 960
cataactaat ctgtaaattg taataaatat atttgcaatt attaaatgtt aagtgatatt 1020
ttggttca 1028

<210> 149
<211> 1425

<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (647)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1359)
<223> n equals a,t,g, or c

<400> 149
gcgtctccgg aagtggaggc gggagcggca cggcagccac tgcttggggt agcgggaggg 60
cagactctgg gcgccactcc cgggccggtc atgaacgggc cggcggacgg cgaagtggac 120
tacaaaaaaa aataccggaa tctgaagcgg aagctcaagt tcctcatcta cgagcacgag 180
tgcttccagg aggagctgag gaaagcgcaa aggaaattac tgaaggtgtc ccgggacaag 240
agtttcctcc tagaccgact tctgcagtac gagaacgtgg atgaagactc ttcggactca 300
gatgccactg catcatcaga taacagcgag acggagggga cacccaagtt gtctgacaca 360
ccggccccta agaggaagag aagccctccg ctgggggggcg ccccctctcc ctccagcctc 420
tccctgcctc cttcaacagg gtttcccctt caggcctccg gggtcccctc cccatacctg 480
agctcgctgg cctcctcccg ctacccccca ttcccttctg actacctggc cctgcagctg 540
cccgasccca gtcccctrag gcccaagcgg gagaaacggc cccgmctgcc ccggaaactc 600
aagatggcgg tgggaccccc cgaytgccct gtgggagggc cgctganctt ccctggccgg 660
ggttytgggg stggggtcgg gamaaccctg amccccttc caccccctaa gatgcccccc 720
cccacgatcc tgagcacggt ccctcggcag atgttcagcg atgcaggtag cggggacgat 780
gccttggatg gagacgatga cctggtgatc gacatcccgg agtgaccgtg acatcacgcc 840
atgcccacca cggccccgcc cggcgccctc cccgtgccag cacacacgag tccagcttcc 900
tcggaggtgt ttattgatgc ccagctgcca tgctccggcc actgacacaa ccagaaaagg 960
cgtaaacatg cacgggtgtc ccccaggagg gtgcaggggc cctgccttca aaccccgggc 1020
ccctccaggg gacagttatt taaacgagtg gccgggagca tctgccacct gctggggagg 1080
cagagaccct gcaatggcca cctctttaaa agggcagctg tacagggcta ggtttttca 1140
atgaagtttc tgtattaaag gagtggctct gggtttgttt tttgtccttt ttttttgaga 1200
cattctcctc ctctgaacct cccctaatcc gacctcctcc ctgttggggg agagggacgg 1260
ggcagcgtgg agaggcagga gtgaggagcg cgggggcctg gggccgggct ctgagcactg 1320
cccgggtgtg cagatgatgg ggggtttgca tatttgcang ggactagcga gtcaggcagg 1380
aggtttgcat atgtgaatat agaactccgc agcccctcat gagca 1425

<210> 150
<211> 780
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (285)
<223> n equals a,t,g, or c

<400> 150
gctgcgagaa gacgacagaa ggggagagcc aatggaaagg ggctgccgcg cggccgtaaa 60

gagtttgtag agcagttcgg gtgcggtacg ttgcattccg gtaccggacg ccgagagcgg 120
tttgtctccg tctctggagt tgtaggcgag aggtgatcat gtccggtcgc gggaaacagg 180
gcggcaaagt gcgagcaaag gccaaatccc gctcctcccg cgcgggcctg cagttcccgg 240
tgggccgagt gcacagactg ctgcgcaaag ggaactacgc ggasnagtgg gcgccggggc 300
gccggtgtac ctggcggcgg tgttggagta ccttacggcg gagatcctgg agctggctgg 360
caacgccgcg cgtgacaaca agaagaccag gataattccc cgccacctgc agctcgccat 420
ccgcaacgac gaggagttaa acaagctgct gggcaaagtg accatcgctc agggcggcgt 480
cctgcccaac atccaggccg tgctgctgcc caagaagacg gagagtcaga agacgaagag 540
caaatgaccc tgacgccgcc ctcagggagc tggctccscc agcaaaggcc cttttcatgg 600
tcgtcccgca atgcttttga atgtgctgga tgtcatggag ggccggtgac atctagcggg 660
gaggtgggcg gcgagggtcc cggcgggagc caataaagtt ggtgaaaatc gtaaaaaaaa 720
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 780

<210> 151
<211> 1066
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1061)
<223> n equals a,t,g, or c

<400> 151
ggacccgcca tggcgcggaa gaaggtgcgt ccgcggctga tcgcggagct ggcccgccgc 60
gtgcgcgccc tgcgggagca actgaacagg ccgcgcgact cccagctcta cgcggtggac 120
tacgagacct tgacgcggcc gttctctgga cgccggctgc cggtccgggc ctgggccgac 180
gtgcgccgcg agagccgcct cttgcagctg ctcggccgcc tcccgctctt cggcctgggc 240
cgcctggtca cgcgcaagtc ctggctgtgg cagcacgacg agccgtgcta ctggcgcctc 300
acgcgggtgc ggcccgacta cacggcgcag aacttggacc acgggaaggc ctggggcatc 360
ctgaccttca aagacgcctc tttttcttca tcagggaaga ctgagagcga aggcgcggga 420
gatcgaacac gtcatgtacc atgactggcg gctggtgccc aagcacgagg aggaggcctt 480
caccgcgttc acgccggcgc cggaagacag cctggcctcc gtgccgtacc cgcctctcct 540
ccgggccatg attatcgcag aacgacagaa aaatggagac acaagcaccg aggagcccat 600
gctgaatgtg cagaggatac gcatggaacc ctgggattac cctgcaaaac aggaagacaa 660
aggaagggcc aagggcaccc ccgtctagaa tgccagaacc agcgggtggc cttaggggct 720
gtgaggcagt ggggacctta ttgatgaaag aaaccgtctt tgcgttacac ccgagtctgc 780
ctctcggagc agggagctca ccttccgcga cgtgttctga gggtctgcat cttaggggggg 840
agggctgggg caaatcgcca cctgtgcctt tcctctggcc ctgctgcccc cacacccaac 900
tccgagggcc cacgctgggg aaagcgggaa gcgctcgctc cctttccccc attagtgctc 960
tctctgcctg gatcccggca gaagctatga aagggaataa agagaaaaga artamaaaaa 1020
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa ncccct 1066

<210> 152
<211> 1649
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1543)

<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1579)
<223> n equals a,t,g, or c

<400> 152
accccggctc tccaaggagg tgtgacatca tcatcatctc tggccggaaa gaaaagtgtg 60
aggctgccaa ggaagctctg gaggcattgg ttcctgtcac cattgaagta gaggtgccct 120
ttgaccttca ccgttacgtt attgggcaga aaggaagtgg gatccgcaag atgatggatg 180
agtttgaggt gaacatacat gtcccggcac ctgagctgca gtctgacatc atcgccatca 240
cgggcctcgc tgcaaatttg gaccgggcca aggctggact gctggagcgt gtgaaggagc 300
tacaggccga gcaggaggac cgggctttaa ggagttttaa gctgagtgtc actgtagacc 360
ccaaatacca tcccaagatt atcgggagaa agggggcagt aattacccaa atccggttgg 420
agcatgacgt gaacatccag tttcctgata aggacgatgg gaaccagccc caggaccaaa 480
ttaccatcac agggtacgaa aagaacacag aagctgccag ggatgctata ctgagaattg 540
tgggtgaact tgagcagatg gtttctgagg acgtcccgct ggaccaccgc gttcacgccc 600
gcatcattgg tgcccgcggc aaagccattc gcaaaatcat ggacgaattc aaggtggaca 660
ttcgcttccc acagagcgga gccccagacc ccaactgcgt cactgtgacg gggctcccag 720
agaatgtgga ggaagccatc gaccacatcc tcaatctgga ggaggaatac ctagctgacg 780
tggtggacag tgaggcgctg caggtataca tgaaaccccc agcacacgaa gaggccaagg 840
caccttccag aggctttgtg gtgcgggacg caccctggac cgccagcagc agtgagaagg 900
ctcctgacat gagcagctct gaggaatttc ccagctttgg ggctcaggtg gctcccaaga 960
ccctcccttg gggccccaaa cgataatgat caaaaagaac agaaccctct ccagcctgct 1020
gacccaaacc caaccacaca atggtttgtc tcaatctgac ccagcggctg gaccctccgt 1080
aaattgttga cgctcttccc ccttcccgag gtccgcaggg agcctagcgc ctggctgtgt 1140
gtgcggccgc tcctccaggc ctggccgtgc ccgctcagga cctgctccac tgtttaacac 1200
taaaccaagg tcatgagcat tcgtgctaag ataacagact ccagctcctg gtccacccgg 1260
catgtcagtc agcactctgg ccttcatcac gagagctccg cagccgtggc taggattcca 1320
cttcctgtgt catgacctca ggaaataaac gtccttgact ttataaaagc caaacgtttg 1380
ccctcttcct ttcccacctc cctcctgcca gtttcccttg gtccagacag tcctgtttgt 1440
ggagtgcaat cagcctcctc cagctgccag agcgcctcag cacaggtgtc agggtgcaag 1500
gaagacctgg caatggacag caggaggcag gttcctggag ctnggggggtg acctgagagg 1560
cagagggtga cgggttctna ggcagtcctg attttacctg ccgtggggtc tgaaarcacc 1620
aagggtccct gaccctacct ccactgcca 1649

<210> 153
<211> 660
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (35)
<223> n equals a,t,g, or c

<400> 153
ccggaaattc ccgggtcgac ccacgcgkcc gcggnagwgc tcacacgtgt gctccctgcc 60
ctgctcctgg ccccttggcc ggccgggctg tttctggcca tgggtcgctc ccgccggaca 120
ggcgcgcacc gagcgcactc tctagcccgg cagatgaagg cgaacggcgg cggccggact 180

tggatgagat tcaccgcgag ctgcggcctc agggatccgc acgaccccag cccgacccaa 240
acgccgagtt cgaccccgac ctgccagggg gcggtctgca ccgctgtctg gcctgcgcga 300
ggtacttcat cgattccacc aacctgaaga cccacttccg atccaaagac cacaagaaaa 360
ggctgaagca gctgagcgtc gagccctaca gtcaggaaga ggcggagagg gcagcgggta 420
tgggatccta tgtgcccccc aggcggctgg cagtgcccac ggaagtgtcc actgaggtcc 480
ctgagatgga tacctctacc tgacatggcc tgaagatgca gggcagagga attgcccatg 540
gacagtgacg caaggactag gctgggaggg agcgtgccaa ccccttttgc ctctgggttt 600
ggggagcgga gggcctcttc ttggtgccct gcccccaata aaggaactgg acaaagagaa 660

<210> 154
<211> 605
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (449)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (574)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (578)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (583)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (587)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (596)
<223> n equals a,t,g, or c

<400> 154
ggcagagctc caccttccat ccggcgccgg ctttcggcgc gacggtcgcc gcgttccatc 60
gtcgcgcggc ccttcgggcg cccgagcccg caatgtcggg ccccaacgga gacctgggga 120
tgccggtgga ggcgggagcg gaaggcgagg aggacggctt cggggaagca gaatacgctg 180
ccatcaactc catgctggac cagatcaact cctgtctgga ccacctggag gagaagaatg 240
accacctcca cgcccgcctc caggagctgc tggagtccaa ccggcagaca cgcctggagt 300
tccagcagca gctcggggag gcccccagtg atgccagccc ctaggctcca agagccccca 360

accgggaccc aaccctgcct ccctgggcta ggctctggcc tgggcactca mcccctggct 420
tagacamctt ctcaagggct ggccttcang gacccctggt gggtctgcct gcctgggcca 480
accttcctgc ctgggsctyc ccttggctam ctgggscagc ccccaccaac tggcatgccc 540
tcctgggggc caaagaatgg ggcctgcaac ccanccantt gcntgcncaa cccaanttcc 600
tgggg 605

<210> 155
<211> 695
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (173)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (499)
<223> n equals a,t,g, or c

<400> 155
gaaccctaga aaaaaggatg cagtactaaa gtgtcattca ttcaaagcca ctcctctttt 60
ggtattccac ccattttcca gacggtgaca ctgaggctca ggaagcagta gggacttgca 120
caaagccctt tgggaagcag gctgggaaac agtggaggga gggtgtccat tanccccaag 180
gagacacagg atctgggctc tktytttsgc cttcctccca gaatacgctg ccatcaactc 240
catgctggac cagatcaact cctgtytgga ccacctggag gagaagaatg accacctcca 300
cgcccgcctc caggagctgc tggagtccaa ccggcagaca cgcctggagt tccagcagca 360
gctcggggag gcccccagtg atgccagccc ctaggctcca agagccccca accgggaccc 420
aaccctgcct ccctgggcta ggctctggcc tgggcactca ccccctggct tagacacctt 480
ctcaagggct ggccttcang gacccctggt gggtctgcct gcytgggcca cccttcctgc 540
ctgggrcctc cccttggkcc tactggggcc agcccccacc acctggcatg ccctcctggg 600
gccaagagtg ggcctgcaam ccacccattg sctgcccaac caattcctgg gcgytcccca 660
wtytgcccag gcttgaatgt tcacatgaaa tgggt 695

<210> 156
<211> 780
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (289)
<223> n equals a,t,g, or c

<400> 156
cggtgggctc gcgttgaggc tgcggtcatg gagggagcag gagctggatc cggcttccgg 60
aaggagctgg tgagcaggct gctgcacctg cacttcaagg atgacaagac caaagtgagc 120
ggggacgcgc tgcagctcat ggtggagttg ctgaaggtct tcgttgtgga agcagcagtc 180
cgcggcgtgc ggcaggccca ggcagaagac gcgctccgtg tggacgtgga ccagctggag 240
aaggtgcttc gcagctgctc tggacttcta gggatctcag ccgtggckna ggccaccccc 300

agaggagccc ctggtccaca gaagcaggcc ttgtgtttcc agcggcctct gataagaggc 360
agggaaggam ctgaaggatt tggarttgat tcaaacaaga tctctgggag tctccagcct 420
gtgcagaagg ggcaggactg cagtgcactg cgggccttgg agtgtccagt ggggacactg 480
gtgtgggaag gggcagcacc tggggagtcc ctgcctctcc tccctgggac aatagtgtgc 540
atgccacccg gggtcctaca ggcaggtgct gggaaaggcc tggccagcag gtagcctgtg 600
tgtttgacaa acagcagctg gcagcgctgc ctcctgccca cattcctgcc acccgacatc 660
aaagctggcg tgtgaccttt ccagccatgc gatattcccc ttggaagatg cttccccagg 720
ctataaattt gttctcacaa agcaacatca ataaatcaaa actgtctcty ccaaaaaaaa 780

<210> 157
<211> 1127
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (1113)
<223> n equals a,t,g, or c

<400> 157
aacttcagtg ccctcactgt agaatttaaa agccttactg ttgattgccc atggtggact 60
tgatggagaa attaaatatc tttcattatg ctttacaaaa tactgtatat gtttcagcaa 120
gtttggggaa tgggagagga caaaaaaaag ttacatttaa tctatgcatt tttgccaagc 180
catattgagt tattttacta ctagagacat taggaaacta actgtacaaa agaaccaagt 240
ttaaaagcat tttgtggggt acatcatttc tataattgta taatgtattt ctttgtggtt 300
ttaaatgata aagacattaa gttaacaaac atataagaaa tgtatgcact gtttgaaatg 360
taaattattc ttagaacact ttcaatgggg gttgcattgt ccttttagtg ccttaatttg 420
agataattat tttactgcca tgagtaagta tagaaatttc aaaaaatgta ttttcaaaaa 480
attatgtgtg tcagtgagtt tttcattgat aattggttta atttaaaata tttagaggtt 540
tgttggactt tcataaattg agtacaatct ttgcatcaaa ctacctgcta caataatgac 600
tttataaaac tgcaaaaaat gtagaaggtt gcaccaacat aaaaaggaaa tatggcaata 660
catccatgat gttttccagt taacatagga attaccagat aaatactgtt aaactcttgt 720
ccagtaacaa gagttgattc atatggacag tatgatttat tgtttatttt tttaaccaaa 780
tacctcctca gtaatttata atggctttgc agtaatgtgt atcagataag aagcactgga 840
aaaccgatcg tctctaggat gatatgcatg tttcaagtgg tattgaaagc cgcactgatg 900
gatatgtaat aataaacata tctgttatta atatactaat gactctgtgc tcatttaatg 960
agaaataaaa gtaatttatg gatgggtatc tttaattttt actgcaatgt gttttctcat 1020
ggctgaaatg aatggaaaac atacttyaat tagtctctga ttgtatataa atgtttgtga 1080
aattccatgg ttagattaaa gtgtrttggg aanaattctc catgggg 1127

<210> 158
<211> 1282
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (120)
<223> n equals a,t,g, or c

<220>

<221> misc feature
<222> (205)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (207)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (236)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (732)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (1279)
<223> n equals a,t,g, or c

<400> 158
tgctctacaa atagtaaaaa taaaaaataa aaaaagtagc tgggcgtggt ggtgtgcacc 60
tgtggtccca gctgcttggg atgctgaggt ggaaggatct cttaaaccca ggagggtggn 120
aggctgcagt gaacttgcga ttgcaccact ggcactccag tctgggggac agagtgagac 180
cccatctcaa aaaagtgttt aattnantat acttgtgagt ggtctatttg catttnaaaa 240
ctgctttcta gaattaggat agctcccttа ggtttaatgt tttggtgagc aggaatatca 300
gttacccctc cagatcttaa ttctagtttt tttatcactt tttcatgagg tgatctcatc 360
ctcatctcct agcatgtctg gcaattttga tttctgaact ctgtgctacc tcagaggcca 420
gcttccttag ggaaaaatca gtgctgaaat aaagttatat ttccttttct gctctaaata 480
tatagtgggg gaataagaga aatgaagagg aattcctgag aacgtaatta ctagaaactc 540
ccctctccca cgtaatgtct ctcacacacc atggacccct attcccccaa tttgcgaccc 600
cccaccccac cccacaacag gtggtgatct ttgtgaagtc tgtgcagcgg tgcattgcct 660
tggcccagct actagtggag cagaacttcc cagccattgc catccaccgt gggatgcccc 720
aggaggagag gnttтaaaga ttttcaacga cgaattcttg tggctaccaa cctatttggc 780
cgaggcatgg acatcgagcg ggtgaacatt gcttttaatt atgacatgcc tgaggattct 840
gacacctacc tgcatcgggt ggccagagca ggccggtttg gcaccaaggg cttggctatc 900
acatttgtgt ccgatgagaa tgatgccaag atcctcaatg atgtgcagga tcgctttgag 960
gtcaatatta gtgagctgcc tgatgagata gacatctcct cctacattga acagacacgg 1020
tagaagactc gcccattttg gaatgtgacc gtctgtcctt caggagagga caccagggtg 1080
ggggtgaagg agacactact gcccccaccc ctgacagccc ccaccccatg gcttccatct 1140
tttgcatcac caccactcct gaacccccat ttctgatttg tcagaatttt tttttaacaa 1200
aactaaaaat gaaacacatg tgtctgtggt atctaaaaaa aaaaaaaaaa aaawwggggg 1260
ggsgcccgta cccattggnc ct 1282

<210> 159
<211> 1505
<212> DNA

<213> Homo sapiens

<400> 159
ttacatgttg cagaagctaa ttgaagagac agataggttt gtagtgttca cagaagagga 60
atcaggcatg agtgaccagt tgtgtggcat tgctgcctgc cagacggatg acatatacaa 120
ccgaaactgc cttattgaat tggtcaacct gtcagatggt tcttcgtgga gcagagacak 180
aaggctgtgt cattgtgtca gctgccaaag cccaactgct gcagtgccag caccatccag 240
cctggtatgg tgatacattg aagcaaaaga catcctggac ttgcctcttg gatggcatgc 300
agtactttgc caccactgaa agcagcccca cagagcagga tggccgacag ctctggttag 360
aggtgaagaa tatcgaggag caccggcagc gtagtctgga ctctgtgcag gagctgatgg 420
agagtgggca ggcagtgggc ggcatggtta ccacaaccac agattggaac cagccagctg 480
aggcacagca agcccagcaa gtccagcgga tcatttcgcg ttgcaactgc cgaatgtact 540
atattagtta cagccatgac attgatcctg aactagcaac tcagattaag ccacctgaag 600
ttcttgagaa ccaggaaaag gaagatctcc taaagaagca ggaaggggct gtggatacct 660
tcacccttat ccaccatgag ctggaaattt ccaccaaccc agctcagtat gccatgatcc 720
tggacattgt caacaacctg ctgctccatg tagaacctaa gcggaaggaa catagtgaga 780
agaagcaacg ggtcaggttc cagcttgaga tctctagcaa tccagaggag caacgcagca 840
gcatactgca tttgcaggag gctgtgcggc agcatgtggc ccaaatacga cagctggaga 900
agcagatgta ttctatcatg aagtctttgc aggatgacag caagaatgag aatctgcttg 960
acctgaacca gaagcttcag ttgcagctaa accaggagaa ggccaacctg cagctggaaa 1020
gtgaagaact gaatatcctc atcaggtgtt ttaaggattt ccaactgcag cgggctaaca 1080
agatggagct gcgaaagcac aagaagatgt gagtgtggtc cgtcgcactg agttttactt 1140
tgctcaggca cggtggcgcc tgacagagga agatggacag ctgggaattg ctgaattaga 1200
actgcagagg ttcctctaca gcaaggtgaa taagtctgat gacacagcag aacatcttct 1260
ggagttgggc tggtttacca tgaacaacct cctccccaat gctgtctata aggtagtact 1320
gcggccccag agctcctgcc agtctgggcg acagctagct ctccgcctct tcagcaaagt 1380
tcggcccccc gttgggggta tctctgttaa ggagcatttt gaggtaaatg tggtgctctc 1440
accatccagc tgacacacca ttcttccaca gatgatgggc ttttctttcc tggccgaagt 1500
gtgga 1505

<210> 160
<211> 736
<212> DNA
<213> Homo sapiens

<220>
<221> misc feature
<222> (718)
<223> n equals a,t,g, or c

<220>
<221> misc feature
<222> (723)
<223> n equals a,t,g, or c

<400> 160
aggcacgagg gacacttggg gtctggacgc aacggcggcg ggagcatgaa cgcccctcca 60
gccttcgagt cgttcttgct cttcgagggc gagaagatca ccattaacaa ggacaccaag 120
gtacccaatg cctgtttatt caccatcaac aaagaagacc acacactggg aaacatcatt 180
aaatcacgtg cctgcttccc cttcgccttc tgccgtgatt gtcagtttcc tgaggcctcc 240
ccagccacgc ttcctgtaca gcctgcagaa ctgtgagtca attaaacctc ttttcttcat 300